40 Rock

POPULAR Computing WEEKLY

35p

15-21 March 1984 Vol 3 No 11

BRITAIN'S BEST-SELLING MICRO WEEKLY

★ STAR
Skull Trap
on Commodore 64
See page 10
GAME ★

News Desk



Business moves from Commodore

COMMODORE has been making some interesting moves since Marshall Smith took over from Jack Tramiel as president three weeks ago

The company has announced two deals to take it into the IBM compatible business market. It has signed a technology licencing agreement with the Canadian manufacturers of the IBM compatible Hyperion machine and it has concluded a deal with Intel to begin manufacture under licence of the Intel 8088 chip used in the IBM Peanut

continued on page 5 ▶

Software houses opt for Amstrad

SOME software houses disappointed at finding the Sinclair QL has no facility for running cassette software, have turned instead to the new computer currently being developed by Amstrad

Amstrad is aiming its micro squarely at the games market and this has also been a factor influencing some companies to opt for it in favour of the more 'serious' QL machine

Most of the major games houses have been approached by Amstrad and a number — including Imagine, CRL and Micromega — are known to be writing for it

The machine is planned for launch in the summer and will be offered in two forms — both including a built in cassette recorder. For £199 the computer will include a separate black-and white monitor. For £229 the price will include a monitor quality colour display in place of the monochrome tv

Commodore's new president Marshall Smith

Shaped rather like the QL and styled in a cream plastic case, the Amstrad includes a full-size professional keyboard with separate numeric and cursor pads

Design of the hardware has been carried out by Ambit in Brentford. The micro is Z80 based with 64K Ram and 32K Rom. It has a three channel sound capability. Twin Atari standard joystick ports and a Centronics printer interface are provided. It has no RS232 or cartridge slot

Like the Oric machine the Amstrad has a variable loading speed from its built-in cassette machine (at the right of the keyboard and numeric pad) — 300, 1200 or 2500 baud. The display has two text modes — either 40 or 80 column and two graphics modes — 192 x 256 pixels and 192 x 86 pixels

The Basic and operating system for the machine have been written by Locomotive Software, a small Leatherhead based systems house. Amstrad Basic is similar in power to BBC Basic, but does not lea

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This Week

● **Street Life** *David Kelly talks to Robert Stein of Andromeda Software on page 12* ● **Programming** *Boris Allan compares Motorola's 68000 and 68008 microprocessors. See page 19* ● **Dragon** *Richard Dodd looks at advanced game programming on page 24* ● **New Releases** *All the latest software including our Pick of the Week — Codename Mat from Micromega. See page 56*

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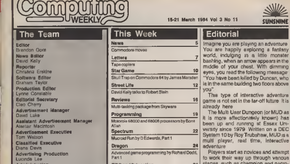
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15-21 March 1984 Vol 3 No 11

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How to submit articles
Articles which are submitted for publication should not be more than 3 000 words long The articles and any accompanying programs should be original It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work

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Editorial

Imagine you are playing an adventure You are happily exploring a fantasy world, indulging in a little monster bashing, when an arrow appears in the middle of your chest. With dimming eyes, you read the following message "You have been killed by Duncan, who is in the same building two floors above you".

This type of interactive adventure game is not set in the far-off future It is already here

The Multi User Dungeon (or MUD as it is more affectionately known) has been up and running at Essex University since 1979 Written on a DEC System 10 by Roy Trubshaw, MUD is a multi player, real time, interactive adventure

Players start as novices and attempt to work their way up through various stages, such as champion and necromancer to achieve the ultimate accolade of witch Points are obtained through experience, combat and by solving numerous puzzles and quests contained in the game Players can even leave messages for one another by writing on objects inside the adventure

But the main obstacle to MUD, and similar programs, gaining a wider airing is the cost of making a telephone call Otherwise Micronet, or a similar system, could be running interactive adventures now, linking players over the telephone lines

Next Thursday

Next week s star game is Flight Simulator for 16K/56K Spectrum by D Murphy, in which you must land your plane safely on the runway

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TWO NEW RELEASES
IT'S THE WOOLUF!
TUBE WAY ARMY

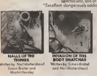


Written by Martin Bullar



Written by Rainbow Software

From the creators of Halls of the Things' 'Invasion of the body snatchas, and many other software classics come these exciting new games. Games to tax your judgement and puzzle and frustrate you for months on end. Don't forget our other titles which have attracted enthusiastic reviews like Spectacular, one of the best games I've seen POPULAR COMPUTING WEEKLY and "Excellent dangerously addictive could change the Spectrum games scene overnight" SINCLAIR USER



HALLS OF THE THINGS
Written by Neil Mattershead, Simon Brattel and Martin Horsley

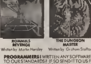
INVASION OF THE BODY SNATCHAS
Written by Simon Brattel and Neil Mattershead



Written by Graham Stafford



ROMMELS REVENGE
Written by Martin Horsley



THE DUNGEON MASTER
Written by Graham Stafford

All titles for 48K Spectrum unless otherwise stated

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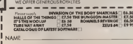


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QL production problems

SINCLAIR has released more information about the production problems which have affected deliveries of its QL computer.

Two design difficulties have been identified — one of the machine's semi-custom chips has required further modification and the operating system software has taken longer to complete than was originally planned. Some sources suggest that the size of the QL's Rom is to blame. The QL has been designed with only a 16K Rom. The delay appears to be associated with problems in fitting the operating system and Basic software into just 16K.

Sinclair claims, however, to be still on target to produce the first production batch of QLs — around 1000 machines — by the end of this month.

● PCW's QL order: Week 5. Still no sign. Interest gained by Sinclair from our order tips over the £3 mark.

Amstrad

continued from page 1

ture procedures. The operating system features some advanced real-time facilities at the interrupt level of Basic. It is possible, for example, to call subroutines after a given time has elapsed. A form of windowing is also offered.

First deliveries of the Amstrad are scheduled for June and a number of high-street chains including Boots, Rumbelows, Currys and Comet are currently evaluating the machine.

Commodore

continued from page 1

The decisions follow the lukewarm reception given to Commodore's 700 Series machines.

Commodore has also decided to follow Atari and begin development of software for machines other than its own. The company is to develop a range of software for the Atari, Apple and IBM computers.

Oric shelves modem

ORIC owners hoping to buy a communications modem for the computer will have to cast their thoughts elsewhere.

Way back in December 1982, Oric advertised the modem at £79.95 along with many other peripherals for the Oric 1.

Last week the company finally announced that plans to actually produce it had been shelved.

Oric has stated that due to insufficient demand and the commitment involved in manufacturing and making the modem available, they have decided the project is not worth pursuing.

As recently as a fortnight ago, there was confusion in the ranks as to the whereabouts and status of the modem.

Oric variously claimed it was still having finishing touches put to it at Oric itself, and that it had been submitted to British Telecom for approval.

Now a unanimous Oric voice has cleared the confusion, and also assured that all money received in response to the original advertisement has been refunded.

Willy arrives next month

JET Set Willy, long awaited follow up to *Manic Miner* is now expected next month. It will be the first major new project from recently formed Software Projects — the Liverpool based software house run by *Miner* author Matthew Smith and ex-Bug Byte employee Alan Maton.

The game continues the story of *Manic Miner* — Willy the Miner is now living in a luxury mansion, thanks to the treasure he discovered in the last cavern of *Manic Miner*. Willy must move through the 50 rooms of his mansion clearing the debris from a decadent party before he can go to bed. The various rooms include *Miner*-like obstacles, but the rooms may be entered in any order.

The game which costs £5.95 will be issued with an unusual piracy protection system. Before play commences the player must input a special colour code. This can only be found from a special grid supplied with the tape. Potential tape copiers would also need to copy the grid which, being in colour, would be expensive.

128K version

THE 128K version of Camputers Lynx computer is, at last, available from Laskys at £399.95.

The machine — called the Laureate — has 64K available Ram, of which 38K can be used from Basic.

Lynx have aimed the Laureate towards the small business market, with a CP/M option.

They are also offering a special deal: Module 1, providing two disc drives plus disc interface, manual and a suite of three Perfect Software packages, all for £699.95.

However, if you buy both the Laureate and Module 1 together, a discount sets the combined price at a few pence under £1,000.

Floppy disc alternative

PHI Mag Systems has announced a data storage system for the BBC micro intended as a low cost alternative to the floppy disc.

Called a Phloopy, it adds 100K of memory from a cartridge containing a continuous loop of tape. Although similar in concept to the Sinclair microdrive, it works on a slightly different principle.

The tape uses a nine-track tape head to write on to ordinary ¼ inch recording tape, eight bits at a time. The ninth track is used as a "clock" track to control the data transfer.

Consequently, the data is stored in a more compressed form. The tape only needs to be 12 feet long and be driven at 15 inches per second — not much faster than on an ordinary open-reel tape recorder.

Inside the cartridge, the tape snakes loosely around the cavity so that it is not liable to snap while in operation. Phi Mag claims the Phloopy will find a file and load or save it in three to four seconds.

The Phloopy will cost £113.85. You will also need to buy an interface for the BBC version at £29.90.

Although the Phloopy is currently only being developed for this machine, Phi Mag is considering producing an interface for other computers. Possible candidates are the Electron and the Commodore 64.

Phi Mag hopes the Phloopy will be available by mail order from the middle of May. Details from Phi Mag Systems, Tregoniggie Industrial Estate, Falmouth, Cornwall.

Sinclair Rom

SINCLAIR has confirmed it is working on a new version of the Rom in the Spectrum Interface 1.

If all goes according to plan the new Rom should appear in 12 to 15 weeks.

The company claims that there should be no problems of software compatibility between the new and old Roms. Machine code programs which use routines in the Interface 1 Rom — such as *Hunter Killer* from Protek — should run without any difficulty providing, according to a Sinclair spokesman — "the recommended accessing points and machine code hooks to the Rom have been used."

Coleco deficit

THE Adam home computer's high production costs and long delays with its US launch, has led manufacturers Coleco to announce a yearly deficit of $7.4m. This is despite Coleco's notoriously successful Cabbage Patch Doll.


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Letters

Rearguard position

Your recent decision to stop accepting advertisements for tape-copying programs in *PCW* raises too many important issues to discuss in a short letter. May I nonetheless make three basic points?

A micro is a machine which has built into it, as an integral part of its operating system, the ability to record on tape or disc a program residing in its memory. Certain software manufacturers, as they are perfectly entitled to do, have decided to take steps to make such recordings as difficult as possible. Other software writers, as they are also perfectly entitled to do, have produced programs which overcome these "protection" devices and restore a perfectly natural and inherent function of the computer.

There is no question that software piracy — like any other form of piracy of books, music, radio broadcasts, pictures, photographs, articles or technical designs — is both illegal and undesirable. There is no question either that the *Save* function of a computer — like a camera, or a typewriter or a photocopier — *could* be used for illegal purposes (although as it happens it rarely is: software pirates make tape-to-tape audio copies which sidestep all possible protection techniques). Your reasoning, however, declares that the *Save* function is *per se* illegal, that anyone who uses it is acting illegally, and that anyone who shows how it may be used is thereby party to an illegal act.

By this reasoning, anyone who advertises tape-recorders or photocopiers for sale (or indeed kitchen knives, which could be used for still nastier illegal acts) is party to a crime, and likewise the page itself in the computer manual which explains how the *Save* function works is immoral and/or illegal.

It is important here to insist on the distinction between copying for personal, instructive use and commercial pirating. Even if the law is not ideally clear, the common-sense distinction is easy to make. Photocopying an article in a book or magazine for one's own practical use is neither wrong nor illegal, photocopying the article for sale, distribution or profit, or plagiarizing it for profit, is obviously so. You do not in any case, attempt to solve the problem by banning photocopiers.

The US Supreme Court has recently ruled that the recording of TV programmes on home video is not illegal: to have declared it so, the Court said, would have been an unacceptable infringement of personal liberty. Informed observers believe that a similar ruling on the subject of computer software, an exactly parallel case, will follow soon. Britain traditionally lags behind the US in the field of consumer law by about a generation.

Meanwhile, I'm sorry to see *PCW* taking up its position in the rearguard, and not the vanguard, of common sense.

Dominic Gill
82 Carlton Hill
London NW8 0ER

The question of tape-copiers and the whole area of software piracy is as old as the software industry itself. In the continued absence of any government legislation on the matter, we have taken a stand against the pirates.

We would be most interested to hear the views of our readers on this subject.

Close to psychosis

I have recently bought a Memotech MTX 512 computer. Although the computer itself is excellent, the Basic manual leaves something to be desired.

"Oh, no! Don't tell me we've now got production problems with the gift to QL customers!"

This being my first computer, I have had to learn Basic from scratch out of the Memotech manual. This is proving almost impossible and what good is an excellent computer if you can't use it?

Could you please tell me if anyone has or is bringing out a book for the MTX before I pull all my hair out, burn the manual, kill all my family, send a letter bomb to Memotech and go completely psychotic.

Stuart Uwers
Skiddaw
Carlisle Road
Annan
Dumfriesshire

Granada are bringing out *Memotech Computing* by Ian Sinclair on March 22. It costs £5.95.

An act of faith

I feel I must write to put a different view to some of the recent articles and correspondence about the delays on the Sinclair QL. Like your anonymous correspondent who wrote under the heading 'Queue Longer?' (*PCW* 1-7 March) I have sent off my order to Sinclair Research Ltd. I am further down the queue than he is, and confidently expect to wait many months before the magic box arrives.

Having witnessed the situation at the launch of the ZX80, ZX81 and Spectrum I never expected 28 days delivery but simply decided to live in hope that my QL would reach me sometime before Christmas (Christmas 1984 that is!). Going on past experience I expect I may then have to return my shiny new QL a couple of times before I get a model which works properly.

Why order a QL then, you may well ask? In my case, it is basically an act of faith in the genius of Sir Clive Sinclair. Quite simply, I know that after the delays and the heartache I will get a computer which far surpasses anything which any other company could produce for an equivalent price. Sinclair has already shown he can do it with his earlier computers, and the enormous sales of those machines together with the vast influx of orders for the QL, show that computer users are convinced that he will again work wonders.

So what if hanging on to my money for several months produces £5 interest for Sinclair. That will mean I will have paid £399 + £5 for the QL. Can anyone tell me where else I can get a comparable machine for £404 before the end of the year? And for those who aren't satisfied with the position, Sinclair Research offers the option of an immediate refund.

I hope that these comments will help put the matter into perspective for other prospective purchasers, and that they will not be deterred from placing an order by the moans and nitpicking. Join the Users Clubs which are already starting up so you whet your appetite by reading about the QL while you're waiting for it! When you do finally receive it, you'll own a computer which is going to be at the forefront of developments in both hardware and software for the next few years — the power of the machine and number of users will ensure that.

John Simpson
56 Greenacres
Shoreham by Sea
West Sussex BN4 5WY

Appropriate noise

Regarding *Z-Fred* (*PCW* 16-22 February), I should like to suggest a couple of changes to give a better display — when you fall off the pyramid a more appropriate noise is given.

Any Spectrum:

```
81 PRINT AT x-1,y;"H"+("I" AND y<>15+(5-level)*2)+("P" AND y=15+(5-level)*2); AT x,y-1;"G"; PAPER 7;" "; PAPER 0;("J" AND y<>15+(5-level)*2)+("N" AND y=15+(5-level)*2); AT x+1,y;"KL"
83 PRINT AT x-1,y;"OI"; AT x,y-1;("G" AND y<>5+level*2)+("M" AND y=5+level*2); PAPER 7;" "; PAPER 0;"J"; AT x+1,y;"KL"
```

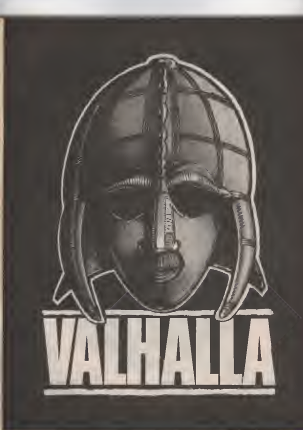
48K only:

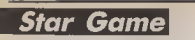
```
72 IF y=15+(5-level)*2 OR y=5+level*2 OR level=0 THEN PRINT AT x,y; PAPER 7;" ": POKE 60060,255: RANDOMIZE USR 60059: POKE 60060,10: PRINT AT 18,10;"YOU FELL OFF": FOR i=1 TO 200: NEXT i
```

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VALHALLA



Skull Trap

A new game for Commodore 64 by James Marsden

This program is a strategy game where the object is to destroy the computer's seven playing pieces by laying mines. The computer in turn is trying to trap and kill you.

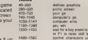
There are nine levels of difficulty number one being the easiest.

Six of the computer's pieces are deadly if they touch you. The seventh piece is fatal if you are on the same line — either x or y axis.

Pressing F1 before you start the game will raise the skill level which is indicated at the top left-hand side of the screen. Press any other key to start. To move your piece, use the following keys

Y U I J M N B H

To drop a mine press F7 — to pick it up again press F1



Notes

40–260	defines graphics
280–320	prints screen
470–720	your go
740–1040	computer's go
1050–1140	computer wins
1150–1240	you win
1250–1450	wait for a key press to start game or F1 to raise skill level
1460–1560	control characters used in the program



```
1 REM ****************
2 REM *              *
3 REM * SKULL  TRAP  *
4 REM *              *
5 REM *      BY      *
6 REM *              *
7 REM * J.H.MARSDEN  *
8 REM *              *
9 REM ****************
10 PRINT"■"CHR$(8)CHR$(142)
20 OA=1:LV=1
30 REM GRAPHICS ************************
40 POKE53280,0:POKE53281,6:POKE53272,21
50 PRINT"■PLEASE WAIT FOR GRAPHICS TO BE DEFINED"
60 POKE56334,PEEK(56334)AND254
70 POKE1,PEEK(1)AND251
80 FORY=0TO511
90 POKE14336+Y,PEEK(53248+Y)
100 NEXTY
110 POKE1,PEEK(1)OR4
120 POKE56334,PEEK(56334)OR1
130 RESTORE
140 FORY=1TO5
150 READT
160 FORX=TTOT+7
170 READS
180 POKEX,S
190 NEXTX,Y
200 POKE53272,31
210 DATA14080,24,60,24,126,24,24,126,195
220 DATA14472,126,219,219,255,231,189,195,126
230 DATA14352,0,0,24,36,36,24,0,0
240 DATA14528,60,126,219,255,126,36,60,24
250 DATA14544,0,195,102,24,24,102,195,0,-1
260 POKE53265,91:POKE53280,0:POKE53282,2:POKE53283,2:
    POKE53284,7
270 REM PRINT SCREEN ******************
280 PRINT"■"LV=10 ■*********************************
    ************":REM SHIFTZ S
290 FORY=1TO20
300 PRINT "■*                                      *■";:REM SHIFT SPACES
310 NEXTY
320 PRINT"■****************************************";:
    REM SHIFT Z 'S
330 REM DEFINE POSITION VARIABLES *****
340 FORY=1TO7:SX(Y)=Y*5:NEXTY
350 FORY=1TO7:SY(Y)=160:NEXTY
360 MX=20:MY=600:C=54272:AS=0
370 P$="■[illegible]"
380 FORY=1TO6
381 POKE1024+SX(Y)+SY(Y),88:POKE1024+SX(Y)+SY(Y)+C,0
382 NEXTY
390 POKE1024+SX(7)+SY(7),81:POKE1024+C+SX(7)+SY(7),3
400 POKE1024+MX+MY,93:POKE1024+MX+MY+C,1
410 REM * TURN GAME ********************
420 PRINT"■[illegible]KULL TRAP"
430 PRINT"■[illegible]ANTI SKULL DEVICES"AS" "
440 IFOA THENGOTO1260
450 POKE53283,14
460 REM YOUR GO *************************
470 PRINTP$;"■ >>>>>>>>>>>>>>YOUR GO<<<<<<<<<<<<<■"
480 POKE2023,160:POKE56295,1
490 POKE198,0
500 X=0:Y=0:D=0
510 F=FRE(0):REM AVOIDS GARBAGE COLLECTION
520 GETA$
530 IFA$=""THENGOTO520
540 IFA$="U"THENY=-40
550 IFA$="N"THENY=40
560 IFA$="H"THENX=-1
570 IFA$="J"THENX=1
580 IFA$="Y"THENY=-40:X=-1
590 IFA$="B"THENY=40:X=-1
600 IFA$="I"THENY=-40:X=1
610 IFA$="M"THENY=40:X=1
620 IFA$="■"THEND=0
630 IFA$="■"THEND=1
640 IFY=0ANDX=0THENGOTO520
650 P=PEEK(1024+MX+MY+Y+X)
660 IFP=88ORP=81THENGOTO1000
670 IFP=91THENAS=AS+1
680 IFP=218THENGOTO500
690 POKE1024+MX+MY,96
700 IFDANDAS>0THENPOKE1024+MX+MY,91:AS=AS-1
710 MX=MX+X:MY=MY+Y
720 POKE1024+MX+MY,93:POKE1024+MX+MY+C,1
730 REM COMPUTERS GO ******************
740 POKE53283,0
750 PRINTP$;"■>>>>>>>>>>>>>MY GO<<<<<<<<<<<<■"
760 S=0
770 F=FRE(0):REM AVOIDS GARBAGE COLLECTION
780 FORL=1TO7
790 IFSX(L)=0THENGOTO980
800 S=S+1:X=0:Y=0
810 IFSX(L)>MXTHENX=-1
820 IFSX(L)<MXTHENX=1
830 IFSY(L)>MYTHENY=-40
840 IFSY(L)<MYTHENY=40
850 POKE1024+SX(L)+SY(L),96
860 SX(L)=SX(L)+X
870 P=PEEK(1024+SX(L)+SY(L))
880 IFP=218THENSX(L)=SX(L)-X
890 SY(L)=SY(L)+Y
900 P=PEEK(1024+SX(L)+SY(L))
910 IFP=218THENSY(L)=SY(L)-Y
920 IFP=91ANDRND(1)>LVTHENGOTO1030
930 IFP=91THENAS=AS+1
940 IFP=88ORP=81THENSX(L)=SX(L)-X:SY(L)=SY(L)-Y
950 IFP=93THENGOTO1060
960 IFL<>7THENPOKE1024+SX(L)+SY(L),88:POKE1024+SX
    (L)+SY(L)+C,0
970 IFL=7THENPOKESX(7)+SY(7)+1024,81:POKE1024+
    SX(7)+SY(7)+C,3
980 NEXTL
990 IFS=0THENGOTO1150
1000 IFSX(7)=MXORSY(7)=MYTHENGOTO1060
1010 GOTO430
1030 POKE1024+SX(L)+SY(L),96
1040 SX(L)=0:SY(L)=0:S=S-1
1050 GOTO980
1055 REM LOST ************************
1060 PRINTP$"                    ";:POKE2023,32
1070 PRINT"■[illegible]"
1080 REM ↑ YOU HAVE FAILED AGAINST
1090 PRINT"■[illegible]"
1100 REM ↑ THE SKULLS AND
1110 PRINT"■[illegible]"
1120 REM ↑ YOU NOW BECOME ONE OF THEM
1130 OA=1
1140 GOTO1300
1150 REM WON ****************************
1160 PRINTP$"                    ";:POKE2023,32
1170 PRINT"■[illegible]"
1180 REM ↑ CONGRATULATIONS YOU HAVE
1190 PRINT"■[illegible]"
1200 REM ↑ DEFEATED THE SKULLS
1210 PRINT"■[illegible]"
1220 REM ↑ YOU ARE FREE TO LEAVE
1230 OA=1
1240 GOTO1260
1250 REM ** WAIT FOR KEY PRESS TO START
         GAME ***********************
1260 PRINT"■[illegible]PRESS A KEY TO PLAY"
1270 POKE198,0
1280 POKE53283,2
1290 FORY=1TO30
1300 GETA$:IFA$<>""THEN1370
1310 NEXTY
1320 POKE53283,10
1330 FORY=1TO30
1340 GETA$:IFA$<>""THEN1370
1350 NEXTY
1360 GOTO1280
1370 IFA$="■"THENGOTO1420
1380 OA=0
1390 FORY=1TO2:NEXTY
1400 OA=0
1410 GOTO280
1420 LV=LV-.1
1430 IFLV<.1THENLV=.1
1440 PRINT"■   ■."LV*10
1450 GOTO1280
1460 REM CONTROL CHARACTERS *********
1470 REM "■" F1
1480 REM "■" F7
1490 REM "■" CRSR DOWN
1500 REM "■" CRSR UP
1510 REM "■" CRSR RIGHT
1520 REM "■" CRSR LEFT
1530 REM "■" CRSR HOME
1540 REM "■" CLEAR SCREEN
1550 REM "■" WHITE
1560 REM "■" ORANGE
```

Hungarian rhapsody

***David Kelly** talks to Robert Stein of Andromeda Software*

Few people are aware Andromeda Software even exists. It's hardly a household name.

Yet the company currently employs 120 programmers writing games software — making it one of the bigger outfits. The games it produces, mainly for the Commodore 64, are acknowledged to be among the most original on sale for the machine.

The reason for the company's comparative obscurity is two fold. First its programs are marketed under the names of the companies to which they are sold — such as Commodore. Second, none of its authors are working in this country — they are based in Hungary.

Andromeda is a joint venture between Robert Stein and Novotrade — a Hungarian company set up with money from Hungary's Innovation Fund specifically to develop computer software.

Explains Robert Stein: "I am Hungarian myself and that gave me the geographical reason to go home.

"My company Vulcan Electronics was one of the major importers of chess computers to the UK and, knowing that literally everybody in Hungary plays chess, I started trying to export Sci-Sys chess machines into Hungary. We held a chess symposium in a hotel in Budapest where we exhibited eight different chess machines and demonstrated them to the Hungarian press.

"Most things in this world happen by coincidence! We got known to the Hungarian companies and one of them has a puzzle — a hand-held game called *The Hungarian Ring*. The project was one of a number financed by the Hungarian Innovation Fund and we were asked to help import the game into the UK. Very soon after that we were asked to attend to a very much bigger project called XL-25 — an electronic game.

"Our task was to take the Hungarian idea, develop it abroad, manufacture it in Hong Kong and distribute it world-wide."

On XL-25 Robert worked closely with the state-owned Hungarian banks backing the Innovation Fund and so became involved with Novotrade when it was formed a year ago.

At that time, what Hungarian software there was consisted of specialised application software packages — engineering programs, drug dose rate software etc.

Robert realised that the Hungarian programming expertise could be turned to produce games software for what was then a fast-growing world demand.

"One lousy day in November 1982 John Baxter — Commodore's marketing manager — and I went to Hungary to talk with Novotrade and meet its managing director Renyi Gabor to persuade him to write games.

"We collected together as many programmers as possible — none of these people had ever written a game before — and we told them what we wanted. As it turned out it is just as well they didn't take our advice. We told them things like *Space Invaders* and *Frogger*. What in fact they produced was far more inventive."

A national television competition was organised for anyone to send in ideas for games software.

"We ended up with 1,500 storyboards. We were day and night sifting out the best. Finally, Commodore selected 30 titles and we gave the go ahead to write the software for the Commodore 64.

"By the time we had produced the first four cassette programs for Commodore — six months later — they had switched to Rom software. Faced with having to start all over again we thought — 'What the hell, Commodore isn't the only company in the market'.

"Commodore went ahead and published *Dancing Monster* on cassette. Others have been sold to Mirrorsoft and to Ocean."

At present, Andromeda has 42 titles at various stages of completion. Eighteen are now finished and most of those have been sold and are soon to be launched by a number of companies.

More will be released by Mirrorsoft, Ocean and Commodore, and some will come out through Virgin and PSS. Talks are continuing with Quicksilva and it is hoped to work with Thorn EMI and K-Tel.

Quicksilva will be selling *Dancing Monster* in the US. Other titles will be released in the US through Creative Software.

So why is Andromeda attracting so much attention? "Not one of our programs resembles other titles written in the Western World," says Robert. "The Hungarians as a people tend to be extremely creative. Their imagination is running away with them without being influenced by what is happening in the Western software world."

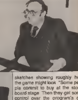
The programmers draw a lot from Hungarian folklore for their inspiration. Graphically, the programs are very strong — Hungary is famous for its animated cartoons.

"With Novotrade you have a software development that is not based on computer literacy. In the UK we have over 1 million machines. In Hungary three dozen computers in the whole country.

"In other words, it is more of a creative activity. If we suddenly turned round and said 'Don't do software — write story books or films' the result would be equally as good."

If the Novotrade software is lacking in any respect, it is in the area of playability. This is where Andromeda comes in — advising on the game flow and on its competitiveness.

Software publishers interested in buying Andromeda software are first shown a storyboard — a few pages of simple



sketches showing roughly how the game might look. "Some people commit to buy at the storyboard stage. Then they get some control over the program's development from that point on."

Novotrade's programmers work in teams of three or four. Each is a specialist in a particular area — one may program the sprites, or the background graphics or the sound. Most of the teams are writing for the Commodore 64. A few work with the Spectrum and BBC computers. "Invariably, each program is written first for the Commodore 64 and then converted to the other machines."

The first thing a team will program for a game is a series of short graphic routines to give an idea of how the finished work will look. These are then taken to Andromeda and to the prospective publisher and discussed. Comments are then passed back and incorporated in the final version.

"We see ourselves as partners with Novotrade. The moment we sell a program the copyright is transferred to Andromeda

There are laws which prevent us, as a UK company, buying into Novotrade but, as and when we are able we are committed to doing so on a 50 50 base "

So far only three Andromeda titles have arrived in the shops Each — *Caesar the Cat Dancing Monster* and *The Juggler* — is quite unlike any other game A main feature of the programs is the large size of the moving graphics.

Within the next three months, another 10 titles will have been released These include (tentative titles only)

Spatial Billiards an outstanding three-dimensional billiards game Instead of the balls being played on a table they appear 'weightless inside a cube The balls can move up and down in space, as well as in the plane of the cube base

In *Catastrophe* you have to construct a building as quickly as you can competing either with a friend or with the computer Along the way your building is subject to a number of natural disasters

The object of *Save Our Seals* is to balance a floating iceberg in such a way that figures on it are saved from the cold water

Unlike the West most of Novotrade's 120 programmers are past their 21st birthdays In fact, between them they have over 300 university degrees Most are working as computer engineers in colleges when they are not programming for Novotrade says Robert "They can program in machine code more easily than in Basic "

Royalties earned by Novotrade are split 50 50 with the programmers And half of that is given in foreign currency "That gives them the ability to travel where they like or buy anything they want — so the programmers are extremely happy "

The Hungarian banks are also pleased because of the foreign currency the venture brings in. The government would be pleased too if they were really aware of what we are doing But government influence in the Hungarian economy is absolutely minimal They would only sit up and take notice if we hit upon another Rubik cube Then suddenly we would find ourselves with additional government help and support "

"If I had to describe in a nut-shell what we are engaged in it would be the mass production of computer software with a strong creative input Programming is considered as an art in Hungary — the computer just happens to be the medium

"Our approach seems to be working The biggest problem at the moment is how to work with everybody who wants to work with us "



The Quill is a major new utility written in machine code which allows even the novice programmer to produce high-speed machine code adventures of superior quality to many available at the moment without any knowledge of machine code whatsoever.

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From The Golden Nib Of The Quill Comes a Gourmet Feast for Hungry Adventurers Volume 1 of the GOLD COLLECTION











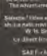
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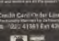
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Learning the lingo

***Andy Wilson** looks at the multitasking package from Skyware Software for the ZX81*

Beginners All-purpose Symbolic Instruction Code or as it is better known Basic is a much criticised language Yet practically every microcomputer on the market uses Basic as its host language

One honourable exception was the Jupiter Ace now sadly demised The Ace's Rom contained not Basic but Forth the makers claiming that Forth was as easy to learn as Basic Despite this, sales were disappointing More and more buyers began to judge micros on their ability to play colourful noisy games rather than as machines on which to learn programming

Nevertheless micro owners looking for a second language for their machine often choose Forth As far as the home market is concerned Forth competes with Logo for second place in the popularity stakes

At what is generally considered to be the bottom end of the market Artic have had ZX81 Forth available on cassette for some time Now David Husband of Skywave Software has released a very extensive and innovative implementation of Forth for the ZX81 — not on cassette but on Eprom

For £29 you can now convert your ZX81 into a very powerful Forth based machine The Eprom is a drop-in replacement for the Sinclair Basic Rom which means that when it is installed you can no longer use Basic

A very good 75 page manual gives a step by step guide to swapping the Roms If your Basic Rom is in socket, there are no problems You simply open the case, remove the Basic Rom, and replace it with the Eprom

If however, you are unfortunate enough to own a ZX81 with the Rom soldered in, it needs to be removed and replaced with the 28 pin socket supplied The manual tends to make this sound easier than it is Desoldering an ic from a double sided pcb is not an operation to be recommended to the faint-hearted and, if you are less than 100 per cent confident of your ability to do so in my opinion you would be foolish to try as you could well end up lifting pcb tracks or even damaging other components through overheating

So if you are considering ordering a Forth Rom check your ZX first If you are dubious about replacing the Rom or maybe just opening the case it is posible to obtain a ready converted machine

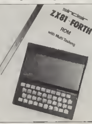
It is also worth noting that if you don't have a Ram pack you will need one as the Forth needs at least 2K of Ram to operate For the purposes of this review I used a ready converted ZX81 complete with 16K Ram pack

Once you have fitted the Eprom, or unpacked the machine the first question to be asked as with most micros is what to do with it? Although this implementation of Forth is designed primarily for control applications many potential purchasers will simply want to lern a new language

David Husband is keen to emphasise that the manual is not a Forth tutorial For beginners he recommends the book *The Complete Forth* by Alan Winfield

It is difficult for a Forth novice such as myself to review this Rom without reviewing the language itself Forth combines the versatility of a low level language with the structure and power of a very high level language Programs are written in a similar way to a procedural language such as Algol or Pascal

The Rom contains an extensive dictionary of commands or words from which new words can be defined which themselves become part of the dictionary Through this process of defining words in terms of previously defined words we eventually end up with a single word, which when typed executes the entire program This method of writing programs makes the programmer attack a problem from a top down approach, which is often considered one of the main prerequisites of good programming



ZX81 Forth is extremely fast the example program given in the manual executes 300 times faster than Basic The main data structure in Forth is the stack

To the beginner one of the most daunting aspects of Forth is the use of Reverse Polish Notation This notation although unfamiliar to most is very easy to adapt to The use of the stack and the manipulation of memory contents should present no problems to anyone who has attempted to use assembly language

Getting back to the Rom when first switched on we are presented with a blank screen Anything typed in will be obeyed immediately, just like a direct command in Basic If you type in a new word definition this is compiled straight away and becomes part of the dictionary The interpreter does not even wait for you to press *Newline*, as since soon as you type a space the previous word is accepted

This takes us to the normal modus operandi of the Rom Pressing *Shift/Edit* presents us with a split screen divided by an inverse line or Pad on which one line of text may be stored The bottom seven lines are the execution screen which behaves in the same way as the initial screen scrolling automatically when the screen becomes full

The top 16 lines are the Edit screen Anything typed in here is not compiled or executed immediately but can be edited using a full screen text editor A flashing cursor is driven around with the cursor keys and characters and lines can be inserted or deleted Both insertion and deletion work in the opposite directions to the Basic editor, which can be rather confusing, especially as the Rubout key backspaces as normal when using the execution screen.

The other quibble with the editor is that when text is inserted in the middle of a line making it more than 32 characters long the characters at the end of the line do not wrap round to the next line, but are lost

If *Shift Q* is pressed the current line is compiled and printed on the execution screen if it is not part of a definition, it will be obeyed immediately The whole edit screen can be compiled by typing the word *CPL* in the execution screen Toggling between the two screens is a simple matter of pressing *Shift/Edit* The word *EOFF* returns you to the power-up screen format

Only one edit screen can be held in memory at a time the usual practice being to write one screen of program compile it then delete the source code and write the next screen until the program is finished If you require a permanent copy of a program, or wish to save a screen for future amendments, the entire edit screen 512

bytes can be saved on cassette as a numbered block using the word *Store* In theory it can be reloaded using *Load* but in practice I was unable to load a screen

To enable me to change earlier definitions when writing a program, I was prompted to write the set of words in Figure 1 for storing named screens in Ram as part of the dictionary

Scr saves space for the screen in the dictionary, eg *Scr Screen1* To save the current screen use *Save* eg *Screen1 Save*, and to retrieve it use *Get* eg *Screen1 Get* The last routine *Pred* dumps the edit screen to the ZX printer

ZX81 Forth has the normal *Fast* and *Slow* modes of Basic as well as an *Auto* mode in which the screen blanks if a process takes longer than a quarter of a second

In his promotional material David Husband states that the keyboard is restored to normal operation This means there are no keywords and everything has to be typed in full Not having used the infamous ZX81 touch keyboard for some time, my finger tips were soon longing for real keys With this Rom a proper keyboard becomes less of a luxury and more of a necessity

The inability to tell if a key has been pressed becomes a serious problem when attempting to break a program or reset the stack with a Warm restart *Break* on the Forth ZX81 is a shifted space Unfortunately if *Shift Space* is held down for over half a second a Cold restart is executed the equivalent of pulling out the power plug

The character set no longer contains the familiar block graphics these are replaced with Ascii characters All of the Ascii characters from *Space* (32) to *Underline* (95) are available and several of the control codes (0–31) are used as well The internal codes as with Sinclair range from 0 to 63 and are found by subtracting 32 from the Ascii code Curiously Ascii 38 the ampersand (&) is not available from the keyboard but it is there try 38 *Emit*

David Husband has saved memory and programming effort for the user by not bothering with the *Newline* characters in the display file This reduces the possibility of crashes when *Poking* or in Forth *C!*ing the screen

ZX81 Forth is integer only, but a full set of arithmetic and logical operations are available using two's complement arithmetic on two byte words There are also a large number of words for unsigned and double precision (four byte) operations

One of the package's many useful features is the ability to work in any number base Two bases are immediately available, using the words *Decimal* and *Hex* but any other base can be chosen simply by changing the value of the Integer variable *Base*

In the usual Forth standards character strings are stored as strings of Ascii numbers on the parameter stack David Husband has simplified string manipulation by incorporating a second stack specifically for strings This means that ZX81 Forth contains a very powerful set of instructions for printing strings converting from Ascii strings to numbers in hex or decimal and formatting numeric output

The other data structure programmers feel is a necessity is the array ZX81 Forth has the standard *Allot* word to save space for an array and the *Builds Does* construct to allow for extremely versatile 'intelligent' arrays

Fig Forth and Forth 79 both have a full set of control structures ie *Begin Again If Else Then Do Loop Begin Until* and *Begin While Repeat* ZX81 Forth has all of these — although the syntax of *While* is slightly non-standard — as well as a very simple to use *Case* command This word did however make me wonder where I had gone wrong when I first tried to use it the problem being that a semi colon usually used to end a definition, is also used to delimit a list of *Case* words meaning that in a definition two semi-colons are required

A few printer control words are included P toggles the printer on and off — when on any text typed or output to the execution screen is also sent to the printer *PRTR* takes an Ascii value from the stack and outputs it to the printer and there is also a facility to control an RS232 interface

Programmers who wish to use machine code routines in their programs essential for I/o control, are not forgotten either the words *Code* and *'C* allow machine code to be included as strings of hex bytes

If the facilities offered by ZX81 Forth stopped there it would be very good value but I have not yet mentioned two of its most exciting capabilities The advertisements for the Sinclair QL make much of the possibilities offered by user defined windows and multitasking David Husband beat Clive Sinclair to it by offering both facilities in ZX81 Forth

Independently scrolling windows of any size are easily defined on any part of the screen Combined with the multitasking this means you can have several programs running simultaneously each with its own screen, and still continue to type in another program!

Multitasking is made possible by a real time clock Any word can be defined as a task and scheduled to operate using *In At* or *Every*, eg *Every 10 Ts* (task seconds) *Task1* The timing periods available are *Tt Ts Tm Th, Td, Tw* and *Ty* (ticks of 1/50th second seconds minutes hours days weeks and years) In theory you could write a program

```
LEAP    LEAP YEAR"   (print "leap year")
TASK LEAP YEAR LEAP
EVERY 4 TRY LEAP YEAR
```

but you would have to leave your ZX81 switched on for a very long time!

The manual warns that most simple demonstrations of multitasking can be trivial but goes on to give a very useful program to continuously display the contents of the stack at the bottom of the screen whilst you continue to use the machine as normal The obvious use for the multitasking capabilities is in the control of external devices — maybe a ZX81 could run a power station after all

Overall the Forth Rom is almost as big an innovation as the introduction of the ZX81 itself David Husband and Skywave Software should soon make an even greater impact when they introduce versions for the Spectrum and BBC

The Spectrum version will be produced as a plug-in module complete with I/o port and Rs232 interface, eliminating the need to remove the Basic Rom all for £59 Although David Husband says that the module will not be primarily for the home market, it will be interesting to see if any games programmers take advantage of the possibilities offered by multitasking

Back to ZX81 Forth again — I cannot recommend it highly enough to anyone who feels they might have an application for it or simply wants to learn Forth and experiment with multitasking My only misgivings are with the loading the lack of documentation of the system variables and the fact I have to return the review model

```
: SCR <BUILDS 512 ALLOT DOES> ;
  SAVE PBUF SWAP COPY ;
  GET PBUF COPY ;
: PRED PBUF 512 + PBUF
       DO
         I C@ 32 + PRTR
       LOOP ;
```

Figure 1

Bits and pieces

***Boris Allen** compares the Motorola 68000 and 68008 microprocessors in the first of a three-part series*

Sinclair Research claims that the QL uses a 32-bit processor Motorola Semi conductors think that its MC68000 series are 16-bit microprocessors And the MC68008 processor used in the QL fetches information from memory a byte at a time, like popular 8-bit microprocessors such as the MDS Technology MCS6502 or Zilog Z80

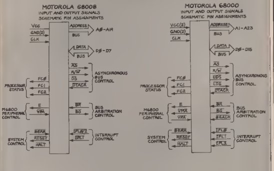
When Sinclair Research designate the MC68008 a 32-bit microprocessor, they are concentrating on the internal structure of the chip The MC68008 has a large and powerful complement of 17 32-bit registers

The 32-bit registers of the MC68008 may be compared to the MCS6502 s four 8-bit registers and the Z80 s more expansive set of seven 8-bit registers (of which six can be combined to form three 16-bit registers) — not forgetting that the Z80 has twin banks of registers

The internal structure of the MC68000 is something we will examine next week

For any microprocessor to be used in the real world, it has to have some way in which it can talk to the world The world for a microprocessor principally consists of banks of memory (Ram and Rom), and the conversation uses the language of the addresses of locations in memory together with their contents

continued over the page



The microprocessor points to locations in memory by giving their address. The 'giving of an address' is performed by the address bus. In both the MCS6502 and the Z80, there is a special register called the program counter which consists of 16 bits. The program counter is used to hold the address of a location in memory.

A 16-bit program counter can take values from 0 to 65535 (a total of 64K possible different values). Each bit of the program counter corresponds to one electrical connection between the microprocessor and the computer's memory.

Each electrical connection corresponds to one pin on the microprocessor package (the chip) — and the pins usually are at a high or low voltage, depending upon whether the corresponding bit value in the program counter is set to one or zero. These 16 pins (and their respective highs or lows) are then considered jointly, and form the address bus. The 16 lines of the address bus are then converted to point to specific bytes. The lines only point in one direction (ie, to a location) and so the address bus is called 'uni-directional'.

When a location is activated by being addressed, either the content of the byte is used to activate special lines (on the data bus) or the lines are used to leave a bit pattern in the byte. In other words either information about the content of the byte is sent to the processor, or information is placed in the location. The data bus is 'bi-directional'.

Data transfer happens by activating high or low potentials at the pins to the processor. Another pin is needed to inform the processor whether information is being sent or received (usually called *Read/Write*). As a byte consists of eight bits, on the MCS6502 or the Z80 the data bus is eight bits wide, which corresponds to eight pins.

The MC68000 has a program counter which is 32 bits wide (like the other registers) of which only 23 bits are used for the address bus. The MC68000 deals in units of two bytes at a time (that is, it has a 16-bit data bus), so there are two other pins — to indicate if the lower and/or upper byte is required.

Effectively, there are 25 pins to isolate bytes, equivalent to a 24 bit address range. The MC68000 can, therefore, address 16M bytes (or 16777216 bytes).

The MC68000, because it transfers data in chunks of 16 bits, is usually called a 16-bit chip, even though the registers are 32-bit. It recognises individual bits, bytes, words (two bytes), and long words (two words).

The MC68008 (as used in the QL) is a modified version of the MC68000, though as far as the programmer is concerned the two processor are identical. That is, if a machine code program runs on the MC68000 it will run without modification on the MC68008. So, where are the differences?

The most obvious difference, is that the MC68008 has an 8-bit data bus, just like the MCS6502 or Z80. Whereas the 8-bit chips only fetch or send data in byte size chunks, the MC68008 can, however, transfer data in long word chunks (even if a byte at a time). The only data types for 8-bit chips are bits and bytes.

By reducing the data bus by eight bits, the number of pins is reduced by eight, and thus the processor package (the chip) is simplified. Many other system features are also simplified. For example, it is possible to use standard 8-bit support chips. The MC68008 is effectively a slower version of the MC68000 (but faster than normal 8-bit chips) and is a 16 bit chip.

A further difference between the MC68000/8 and the MC68000 is the address bus — rather than being an (effectively) 24-bit bus (25 pins) the address bus consists of 20 bits (20 pins). The MC68008 therefore can only address 1 Mbytes. With some other savings, the 64 pins of the MC68000 are reduced to 48 pins for the MC68008 (the MCS6502 and Z80 have 40 pins).

Beam me up, Scotty

***D Edwards** presents* Mucroid Run *— the ultimate Star Trek Game*

This program, which will be serialised over the next three weeks takes the game of *Star Trek* to its limits

You are in charge of the Starship *Enterprise* Your mission is to recover a consignment of dilithium crystals stolen by the dastardly Mucroids You will have to explore uncharted sectors of space avoiding high tech mines and attacking Mucroids shielded by cloaking devices

The program which uses speech if you have a Currah Microspeech unit, is for the 48K Spectrum and is divided into two parts — the initialiser, which *Pokes* the new character set and machine code into Ram and the actual game

The program will be printed over the next three weeks Enter each weekly part, then *Save* it. The following week reload it and type in the rest of the program

Once the initialiser has *Poked* in the machine code it uses a routine in the Spectrum s Rom to scroll the screen upwards one character space at a time This routine is located at address *3280*

If you are not careful when using it your Spectrum will reply '*Scroll?* Then you must reply by typing *n*, If you do not wish to continue, or any other key if you do

The way to stop this is to fool the Spectrum into thinking that it has only done one scroll by using *Poke 23692,2* before the routine is called, eg

```
10 FOR A=0 to 100
20 POKE 23692,2:RANDOMISE USR 3280
30 NEXT A
```

The actual game revolves mainly around lines 280 to 450 This is the main loop which moves the Mucroids ships and checks to see if you have found the crystal, etc.

The main reason for the extraordinary length of the program is because a game can end in many ways For example you could be destroyed through accumulated damage, run out of power, destroy the crystal destroy the tractor beam or find the crystal Whichever of these occur, at the end of the game the Grand Mucron will present himself to you in all his hideous glory

If you do not have a Currah Microspeech for your Spectrum it is not necessary for you to type in the sections of lines which define *s$* These lines program the speech synthesiser so that it makes comments as you are playing.

Next week, we will discuss how to obtain extra character set on the Spectrum

```
First the initialiser.Type this in
   1 LET s$="welcum t(guu)"
   2 PAUSE 30  LET s$="aycr(oy)D
   5 PAUSE 30  LET s$="run"  PAU
SE 30
  10 REM [illegible]
  15 CLEAR 63999  LET keys=0
  20 PAPER 0  BORDER 0  INK 7  O
VER 0  INVERSE 0  BRIGHT 0  FLAS
H 0  CLS
  25 PRINT AT 10,10, INK 6, PAPE
R 2, FLASH 1,"STOP THE TAPE"  PA
USE 100  CLS
  30 PRINT AT 4,4, INK 4,"MUCROI
D RUN INITIALISER"
  40 PRINT AT 8,10, INK 5;"© D.E
DWARDS",AT 10,11, INK 3;"10/5/19
83"
  50 PRINT AT 14,10;"PLEASE WAIT
,
  60 GO SUB 9500
  70 FOR x=0 TO 21  BEEP .01,x
PRINT AT x,0, OVER 1, PAPER x/4,
"  NEXT x
  75 PAUSE 50  LET s$="in;(ah)ul
(ii)z(aa)(ah)un"
  76 PAUSE 20  LET s$="compl(ee)
t"
  80 FOR x=0 TO 30  BEEP .01,20-
x  LET sc=USR 3280  NEXT x
  90 LET a$="    INITIALISATION
COMPLETE     "  LET b$="      LOA
DING MUCROID RUN      "
 100 FOR x=0 TO 9  PRINT AT x,0,
 INK x/2,a$  BEEP .01,x  PRINT I
NK x/2,AT x,0, OVER 1,a$  NEXT x
  PRINT AT x,0, INK x/2,a$
 110 FOR x=31 TO 1 STEP -1  PRIN
T INK 4,AT 14,0,b$(x TO 30)  BEE
P .01,x  NEXT x
 120 PAUSE 100  INK 0. LOAD ""
9500 FOR z=15616 TO 16384  POKE
z+48384,PEEK z  NEXT z
9505 RESTORE 9510  FOR a=65000 T
O 65075  READ n  POKE a,n  NEXT
a
9510 DATA 0,0,197,33,15,3,17,3,0
,229,205,181,3,225,17,16,0,167,2
37,90,126,254,255,32,237,193,16,
230,0,17,1,0,33,35,19,205,181,3,
17,2,0,33,15,7,205,181,3,201,0,0
9515 DATA 33,0,64,17,80,195,1,19
2,20,237,176,201,33,00,195,17,0,
64,1,192,26,237,176,201
9520 FOR z=64126 TO 64207  READ
n  POKE z,n  NEXT z  FOR z=64264
 TO 64464  READ n  POKE z,n  NEX
T z
9530 DATA 0,126,70,74,82,98,126,
0,0,24,24,0,0,6,60,0,0,126,2,2,6
2,64,126,0,0,126,6,60,6,6,126,0,
0,64,64,72,126,8,8,0,0,126,64,64
,124,0,126,0,0,60,32,32,126,98,1
26,0,0,62,2,2,4,4,4,0,0,60,36,12
6,66,66,126,0,0,60,36,60,6,6,6,0
9535 DATA 0,126,70,70,126,70,70,
0,0,124,68,124,66,66,126,0,0,62,
32,96,96,96,126,0,0,62,34,98,98,
98,126,0,0,62,32,56,124,96,126,0
,0,126,96,96,124,96,96,0,0,62,32
,96,110,100,124,0,0,34,34,98,126
,98,98,0,0,24,24,24,24,24,24,0,0
,62,12,12,12,12,60,0,0,34,34,62,
36,36,36,0
9540 DATA 0,32,32,96,96,96,126,0
,0,62,42,106,106,106,106,0,0,62,
34,98,98,98,98,0,0,62,34,98,98,9
8,126,0,0,62,34,126,96,96,96,0,0
,62,34,98,106,126,8,0,0,62,34,12
6,100,98,98,0,0,126,64,124,6,6,1
26,0,0,126,8,24,24,24,24,0,0,34,
34,34,98,98,126,0,0,66,66,66,36,
36,24,0
9545 DATA 0,34,42,42,106,106,126
,0,0,66,36,24,24,36,66,0,0,66,36
,36,24,24,24,0,0,126,2,4,24,32,1
26,0
9550 RESTORE 9555  FOR x=0 TO 10
  READ c$  FOR o=0 TO 7  READ n
 POKE USR c$+o,n  NEXT o  NEXT x
9555 DATA "A",0,1,9,29,63,127,12
1,199,"B",209,24,153,231,189,255
,24,0,"C",0,128,64,184,252,120,1
34,3,"D",196,36,24,60,126,64,36,
125,"E",0,3,1,29,63,126,190,199,
"F",102,24,153,231,189,255,24,0,
"G",0,192,120,152,252,126,6,3,"H
",108,17,0,0,0,128,32,1,"I",130,
33,4,61,0,136,32,0,"J",0,0,0,66,
36,24,0,0,"K",0,0,24,36,66,0,0,0
9560 POKE 23607,249  RETURN

And save it with
SAVE "initialise" LINE 1
And now a few screens from the
game
```

POWER 646 SCORE 0 POWER LOSS 0
SECTOR 1 TRACTOR 20 MUCROIDS 4

```
5 REM *****MUCROIDS RUN**** *** B.EDWARDS **
10 PAPER 0: BORDER 0: INK 7: OVER 1: CLS : GO SUB 30: GO SUB 70: PRINT AT 9,15; INK 6; PAPER 0;" "; AT 10,15;" ": LET g= USR 65050: GO TO 160: REM WHICH GOES ON TO DEFINE VARIABLES
30 BRIGHT 0: BORDER 0: PAPER 0: INK 7: OVER 1: CLS : INK 1: PLOT 0,175: DRAW 88,0: PLOT 88,175: DRAW 80,0: PLOT 168,175: DRAW 86,0: PLOT 84,175: DRAW 0,-16: DRAW 82,0: DRAW 0,16
31 LET gy=10: LET gc=6: FOR g=1 TO 6: PLOT 1,192-gy: DRAW 84,0: PLOT 169,192-gy: DRAW 85,0: PLOT 1,gy: DRAW 253,0: LET gc=gc-1: LET gy=gy+gc: NEXT g: PLOT 0,16: DRAW 255,0: DRAW 0,159: PLOT 0,175: DRAW 0,-159: FOR f=1 TO 150: PLOT INK RND *4+1; RND *235+10, RND *100+45: NEXT f: PRINT AT 21,0; PAPER 2; INK 7; BRIGHT 1;"SECTOR: TRACTOR: MUCROIDS: ": PRINT BRIGHT 1; AT 20,0; PAPER 2; INK 7;"POWER: SCORE: POWER LOSS: "; INK 7: RETURN
40 REM ACTIVATE SHIELDS
50 PAPER 1: INK 6: FLASH 1: PRINT OVER 0; AT 1,11;"SHIELDS ON": LET sh=1: FOR f= 40 TO -20 STEP 4: BEEP .1,f: NEXT f: PRINT AT 1,11; OVER 0;"SHIELDS :";shpo: FOR f=1 TO 40 STEP 2: BEEP .003,f: NEXT f: FLASH 0: PAPER 0
60 LET a$="shields on": PAUSE 0: BEEP 1,12: LET sh=1: LET po=po-shpo*2: GO SUB 460
65 RETURN
70 REM DRAW CROSSHAIRS
72 INK 6: BRIGHT 1: PLOT 119,96: DRAW 30,0: PLOT 136,96: DRAW 30,0: PLOT 127,104: DRAW 0,30: PLOT 127,97: DRAW 0,-30: BRIGHT 0
89 RETURN
90 REM CHARGE LASER CANNON
100 BRIGHT 1: FOR f=8 TO 0 STEP -1: INK f: LET click= USR 65030: PLOT 85,104: DRAW 35,35: PLOT 134,139: DRAW 35,-35: PLOT 170,69: DRAW -35,-35: PLOT 119,54: DRAW -35,35: NEXT f: BRIGHT 0
103 IF str AND box>10 AND box<14 AND boy>19 AND boy<23 THEN PRINT AT 1,11; PAPER 1; INK 6; FLASH 1; OVER 0;" CYCLOID "; FOR f=0 TO 7: LET click= USR 65030: NEXT f: PRINT AT 1,11; PAPER 1; INK 6; FLASH 1; OVER 0;" DAMAGE ": LET sound= USR 65002: PRINT AT 1,11; INK 0; PAPER 0; OVER 0; FLASH 0;" ": LET da=da+ INT ( RND *10): GO SUB 460
105 LET po=po-25: IF ATTR (9,15)=6 AND ATTR (9,16)=6 THEN GO TO 108
106 GO SUB 460: IF ATTR (10,15)=6 AND ATTR (10,16)=6 THEN GO TO 108
107 GO SUB 70: GO SUB 70: RETURN
108 LET kk=kk+1: PRINT OVER 1; INK 6; AT x1,y1;k$: OVER 0: GO SUB 70: BRIGHT 1: PRINT INK 0; AT x1,y1;k$: LET sc=sc+10: LET k(s)=k(s)-1: GO SUB 460: FOR i=7 TO 0 STEP -1: INK i: FOR b=1 TO 0 STEP -1: BRIGHT b: PRINT OVER 1; AT x1,y1;"[]": PAUSE 3: BEEP .01,f: PRINT AT x1,y1; OVER 1;"  ": NEXT b: NEXT i: LET disp= USR 65044: GO SUB 460: LET c=c+1: IF cry=1 AND k(s)=0 THEN GO TO 1050
109 GO SUB 490: GO TO 330
110 REM MUCROIDS FIRE BACK
111 RESTORE 121
112 IF x >= 17 THEN RESTORE 122
113 LET a$="wat(ch) out": PAUSE 50
120 OVER 1: LET dan=0: FOR f=0 TO 6 STEP 5: INK f: PRINT AT x1,y1;k$: PRINT OVER 1; AT x1,y1;k$: NEXT f: FOR j=0 TO 1: READ ink: INK ink: BRIGHT 1: PLOT y1*8+10,165-x1*8: DRAW -10,-5: PLOT y1*8+10,165-x1*8: DRAW -15,-5: PLOT OVER 1;y1*8+17,165-x1*8: DRAW OVER 1;-10,-5: PLOT OVER 1;y1*8+10,165-x1*8: DRAW OVER 1;-15,-5: NEXT j: BRIGHT 0: LET sound= USR 65002: FOR f=10 TO 50 STEP 8: OUT 254,f*2: OUT 254,234-f: BORDER 0: NEXT f
121 DATA 2,6
122 DATA 2,1
125 LET dan= INT ( RND *10): IF sh=1 THEN LET dan=dan-shpo
126 IF dan <= 1 THEN LET dan=1
130 IF x >= 9 AND x <= 10 AND y >= 14 AND y <= 18 THEN LET da=da+dan+ INT ( RND *10)
131 IF INT ( RND *20)=1 AND da >= 3 THEN LET da=da- RND *5
135 LET da=da+dan
136 PRINT AT 1,11; OVER 0; PAPER 0; FLASH 0;"          "
140 IF da >= 99 THEN GO SUB 550
150 BORDER 0: LET sh=0: LET mv= INT ( RND *2)+1: GO SUB 460: RETURN
160 REM SET UP SECTORS AND POSITON MUCROIDS
170 LET kk=0: DIM p(8,20): DIM k(8): FOR a=1 TO 8: LET p(a,1)= INT ( RND *31)+1: NEXT a
180 REM IF p(subscript1,1) <= 2 then klingons are in that sector
190 FOR a=1 TO 8: IF p(a,1) <= 2 THEN LET no= INT ( RND *6)+1: LET kkk=kkk+no: LET k(a)=no: FOR c=1 TO no: LET p(a,1+c)= INT ( RND *51)+1: LET p(a,8+c)= INT ( RND *15)+5: NEXT c
191 NEXT a
192 FOR a=1 TO 8: IF INT ( RND *10) >= 4 AND k(a) >= 1 THEN LET p(a,20)=1
193 NEXT a
194 LET a= INT ( RND *8)+1
195 IF p(a,20)=1 THEN LET p(a,20)=3: GO TO 200
197 LET p(a,20)=2
198 IF k(a)=0 THEN LET p(a,20)=0: GO TO 194
220 REM DEFINE VARIABLES
230 LET t=700: LET box= INT ( RND *12)+5: LET boy= INT ( RND *20)+3: LET mv= INT ( RND *2)+1: LET suc=1: LET shpo=1: LET kk=0: LET cry=0: LET tra=0: LET str=1: LET tr=20: LET sh=0: LET c=0: LET po=700: LET ch=0: LET k$= "ABC": LET da=0: LET s= INT ( RND *7)+1: LET sc=0
240 LET c=1
250 LET g=0: LET c=0: GO SUB 460: GO SUB 490: REM ANABORS ETC+ X AND Y POSITIONS FROM ARRAY
260 PRINT AT 15,1;"LONG RANGE SCANNER ACTIVATED ": FOR f=1 TO 70: NEXT f: PRINT OVER 1; AT 15,1;"LONG RANGE SCANNER ACTIVATED": BEEP .1,12
270 IF SGN k(s)=0 THEN LET ch=1: GO SUB 280
280 LET i$= INKEY$ : IF i$ >= "1" AND i$ <= "8" THEN LET s= CODE i$-48: LET display= USR 65044: LET ch=0: FOR f=0 TO 60 STEP 5: BEEP .01,f: NEXT f: LET po=po-s*5: GO SUB 460: GO SUB 490: BEEP .1,-12: GO TO 300
290 IF ch=1 THEN BEEP .01,-12: PAUSE RND *5+1: GO TO 280
310 LET rn= INT ( RND *4)
330 REM POSITION+ MOVE MUCROIDS
331 LET t=t-1: IF INKEY$ ="s" OR INKEY$ ="w" THEN LET shpo=shpo-( INKEY$ ="s" AND shpo>1)+( INKEY$ ="w" AND shpo<9): PRINT AT 1,11; PAPER 1; INK 6; OVER 0; FLASH 1;"SHIELDS: ";shpo: BEEP .1,shpo: REM PRINT AT 1,11; PAPER 0; OVER 0;"          "
335 PRINT AT 9,15; PAPER 0; INK 0;"  "; AT 10,15;"  "
340 PRINT INK 6; AT x,y;k$: LET x1=x: LET y1=y: IF str=1 THEN PRINT INK 5; AT box,boy;"B": LET b1=box: LET b2=boy
342 IF suc AND INT ( RND *100)<4 THEN GO SUB 525
343 LET x=x+1: IF mv=1 AND x<rn-10 THEN LET y=y+1
344 IF mv=1 AND x>10+rn THEN LET y=y-1
345 IF INT ( RND *20)=2 THEN GO SUB 110
348 IF str THEN LET box=box+ RND *4- RND *4: LET boy=boy+ RND *4- RND *4: IF box<4 OR box>15 OR boy<2 OR boy>22 THEN LET box= INT ( RND *11)+4: LET boy= INT ( RND *25)+2
354 IF tra THEN GO SUB 460
355 IF INKEY$ ="t" THEN LET tra=1: PRINT PAPER 1; INK 6; OVER 0; FLASH 1; AT 1,11;" TRACTOR ": FOR f=1 TO 10: BEEP .04,f*2: NEXT f: PRINT PAPER 1; INK 6; OVER 0; FLASH 1; AT 1,11;" BEAM ON ": FOR f=1 TO 8: LET click= USR 65030: NEXT f
356 IF cry AND tra AND x=9 AND y=15 OR cry=1 AND tra=1 AND x=9 AND y=16 OR cry=1 AND tra=1 AND x=10 AND y=15 OR cry=1 AND tra=1 AND x=10 AND y=16 THEN GO TO 2000: REM YOU FIND CRYSTAL
357 IF tra THEN LET tr=tr-1: IF tr<1 THEN GO TO 3000: REM YOU LOSE
358 IF kk=kkk THEN GO TO 1050
360 IF mv=2 AND x 10+rn THEN LET y=y-1
365 IF mv=2 AND x rn-10 THEN LET y=y+1
380 IF INKEY$ ="a" THEN GO SUB 40
390 IF INKEY$ ="h" THEN FOR g=0 TO 2: FOR b=0 TO 7: BORDER b: BEEP .01,b: NEXT b: NEXT g: BORDER 0: LET x= INT ( RND *14)+4: LET y= INT ( RND *24)+3: LET po=po-20: GO SUB 460
400 IF x>14 THEN LET x=x-4
401 IF y>26 OR y 3 THEN LET y=5 OR y=9
402 IF x<5 THEN LET x= INT ( RND *12)+5
420 IF INT ( RND *15)=5 THEN LET mv= INT ( RND *2)+1
430 LET po=po-( INKEY$ ="y")-( INKEY$ ="u")-( INKEY$ ="i")-( INKEY$ ="n"): LET x=x+(2*( INKEY$ ="u"))-(2*( INKEY$ ="i")): LET y=y+(2*( INKEY$ ="n"))-(2*( INKEY$ ="y")): IF INKEY$ ="p" THEN GO SUB 90
445 PRINT OVER 1; INK 0; AT x1,y1;k$: IF str=1 THEN PRINT OVER 1; INK 0; AT b1,b2;"B"
450 GO TO 300
460 PAPER 2: INK 7: PRINT BRIGHT 1; OVER 0; AT 21,7;s; AT 21,18; INT (tr);" "; AT 21,30;k(s): PRINT BRIGHT 1; OVER 0; AT 20,6; INT (po); AT 20,16; INT (sc); AT 20,30; INT (da): PAPER 0
461 IF po <= 1 THEN GO TO 600
462 IF da>99 THEN GO TO 550
480 RETURN
490 LET cry=0: LET str=0: LET x=p(s,1+c): LET y=p(s,20-c): IF p(s,20)=2 AND k(s)=1 OR p(s,20)=3 AND k(s)=1 THEN LET cry=1
491 IF p(s,20)=1 OR p(s,20)=3 THEN LET str=1: IF str=1 THEN LET box= INT ( RND *11)+4: LET boy= INT ( RND *20)+3
492 IF cry=1 AND k(s)=0 THEN GO TO 1050
493 IF SGN k(s) <> 1 THEN GO TO 510
494 IF po <= 20 THEN PRINT FLASH 1; PAPER 1; INK 6; AT 1,11;" POWER LOW"
495 IF c >= 7 THEN GO TO 510
496 IF x=0 OR y=0 THEN LET x= INT ( RND *12)+5: LET y= INT ( RND *25+4)
497 IF po <= 1 THEN GO TO 600
498 IF cry=1 THEN PRINT FLASH 1; PAPER 1; INK 6; AT 1,11;" CRYSTAL "
499 RETURN
510 REM NO MUCROIDS MESSAGE
520 LET a$="NO MORE MUCROIDS ARE PRESENT": FOR w=1 TO LEN a$: PRINT AT 16,w;" "; CHR$ 8; OVER 0;a$(w): NEXT w: LET a$="                            ": FOR w= LEN a$ TO 1 STEP -1: PRINT AT 16,w;" "; CHR$ 8; OVER 0;a$(w): NEXT w
521 LET c=1: LET ch=1: GO TO 280
525 REM GRAND MUCRON ATTACKS
526 PAUSE 10: LET a$="hi(ar) hi(ar)": PAUSE 10: PRINT OVER 0; AT 0,11; PAPER 1; INK 6; FLASH 1;" GRAND "; AT 1,11;" MUCRON ": INK 0: FOR f=5 TO 8: PRINT AT f,20-f;"EFG": BEEP .07,f: IF f >= 7 THEN BORDER 4-3: PLOT 105,160-f*8: DRAW -40,-f*3: PLOT 110,160-f*8: DRAW 40,-f*3: PLOT OVER 1;110,160-f*8: DRAW OVER 1;40,-f*3: PLOT OVER 1;105,160-f*8: DRAW OVER 1;-40,-f*3
527 BORDER 0: PRINT AT f,20-f; OVER 1;"EFG": NEXT f: PRINT OVER 0; PAPER 0; INK 7; FLASH 0; AT 0,11;"          "; AT 1,11;"          ": PLOT OVER 0; INK 1;0,175: DRAW OVER 0; INK 1;255,0
```

continued next week

Cut and run

***Richard Dodd** looks at advanced gama programming in the first of a three part series*

In this three part article for the Dragon 32 computer I will be going through the stages of development of a fairly simple game It is called *Lawn Mower* and uses high resolution graphics and sound To obtain detailed graphics I have had to use the highest graphics resolution, which limits you to black and white

The game puts you in charge of a runaway lawn mower, which you must try to steer around the garden avoiding the trees When you have cut enough of the grass, you will go on to the next level with the lawn mower now going faster To add to your problems, the fuel is running out When it runs out, you will lose one of your three lives To refuel you must run over one of the fuel cans.

When you are designing a game, there are three main sections

1. GRAPHICS & SCREEN & USER DEFINABLES
2. MOVEMENT & CHECK ROUTINES
3. FINISHING TOUCHES

GRAPHICS

When writing a game, the design of the screen layout is one of the first tasks An attractive screen using good graphics can make all the difference

An example of a screen is shown in figure 1 The screen should be designed on a 32 x 24 grid, with each square being made up of 8 x 8 dots, which are either black or white

When you have decided what the screen is to look like you will more than likely need to define some special characters eg, the fence, lawn mowers trees, and fuel cans in figure 1 The easiest way to produce these characters is to *Poke* them to the screen

The character must first be drawn on an 8 x 8 grid, as shown in figure 2, with each square being black or white The character can then be divided into 8 rows of 8 dots and the value for each row can be worked out as shown in figure 3

Once all eight values have been worked out using this method they can be stored in a *Data* statement Program 1 shows the *Pokes* needed for the characters included in this program As the Dragon cannot print either numbers or letters on the high resolution screen, the *Pokes* for these also have to be worked out

To save you the effort of working these out, all the *Pokes* for the letters and numbers are shown in program 2 The *Data* statements are arranged in order of their Ascii codes The special characters replace some of these characters The first nine characters are special characters for use with my program More next week

Figure 1

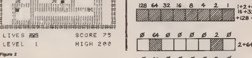
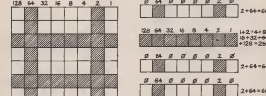
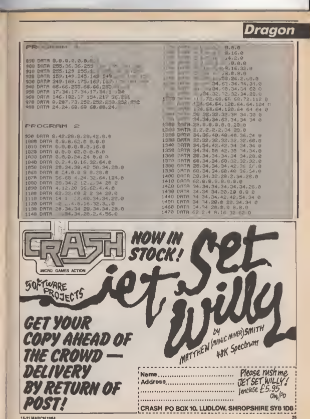


Figure 2

Figure 3



TO POKE THIS CHARACTER USE THE VALUES 66, 66, 255, 66, 66, 255, 86, 86

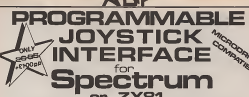


PROGRAM 1

```
890 DATA 0,0,0,0,0,0,
900 DATA 255,36,36,255
910 DATA 255,129 255,1
920 DATA 159,149,245,149 149
930 DATA 249,169,175,169,169
940 DATA 66,66,255,66,66,255
950 DATA 17,34,17,34,17,34,1 ,34
960 DATA 146,102,37 154,217 36,214
970 DATA 0,207,73,252,252,252,252,252
980 DATA 24,24,60,60 60,60,24,
```

PROGRAM 2

```
990 DATA 8,42,28,8,28,42,8,0
1000 DATA 0,8,8,62,8 8,0,0
1010 DATA 0,0,0,0,8,8,16,0
1020 DATA 0,0,0 62,0,0,0,0
1030 DATA 0,0,0,24,24 0,0 0
1040 DATA 0,2,4,8,16,32,64,0
1050 DATA 28,34,38,42 50,34,28,0
1060 DATA 8 24,8,8 8 8,28,0
1070 DATA 56,68 4,24,32,64,124,0
1080 DATA 28,34,2 12,2,34 28 0
1090 DATA 4,12,20 36,62,4,4,0
1100 DATA 62,32,60 2 2 34 28,0
1110 DATA 14 1 .2,60,34,34,28,0
1120 DATA .2 ..,4,8,16,32,3.,0
1130 DATA 28,34,34 28,34,34,28,0
1140 DATA ..34,34,28,2,4,56,0
      8,0,0
      8,16,0
      ,4,2,0
      ,0,0,0
      8,16,32,0
      8,0,8,0
      58,26,2,60,0
      34,62,34,34,31,0
      34,60,34,34 60 0
      34,32,32,32,34,28,0
      72,68,68 68,72,112 0
      124,64,64,120,64,64,124 0
      124,64,64,120,64 64 64 0
      30 32,32,32,38 34,30 0
      34,34,34,62,34,34 34 0
1300 DATA 28,8,8,8,8,8,28 0
1310 DATA 2,2,2,2,2,34 28,0
1320 DATA 34,36,40,48,48,36,34 0
1330 DATA 32,32,32,32,32,32,60,0
1340 DATA 34,54,42,42,34 34,34 0
1350 DATA 34,34,50 42,38 34,34,0
1360 DATA 28,34,34,34,34 34,28,0
1370 DATA 60,34,34,60,32,32,32,0
1380 DATA 28,34,34,34,42,36 26,0
1390 DATA 60,34,34,60,40 36,34,0
1400 DATA 28,34,32,28,2,34,28,0
1410 DATA 62,8,8,8,8,8,8,0
1420 DATA 34,34,34,34,34,34,26,0
1430 DATA 34,34 34,20,20 8,8 0
1440 DATA 34 34,34,42,42,54,34 0
1450 DATA 34 34,20,8 20,34,34 0
1460 DATA 34,34 20,8,8 8,8,0
1470 DATA 62 2,4 8,16 32 62 0
```



AGF PROGRAMMABLE INTERFACE

Recognised as the only true Hardware Programmed joystick interface this product offers all the features associated with such a design.

You can use any Atari-compatible joystick controller with *any* software for your Sinclair Spectrum or ZX81, not just those with a joystick option.

Movement of the joystick is recognised by the computer *exactly* the same as pressing the appropriate control keys and can therefore give the most immediate response to that movement. The hardware programmed design works with *all* possible key-reading methods, both BASIC and Machine Code.

Eight directional movement, with or without the fire button being pressed, can be achieved by only programming the left, right, up down and fire keys required by the game.

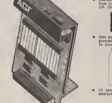
Programming is achieved by a two-digit code, which is looked up on the Programming Chart supplied for each direction and firing button. These two numbers are then selected on a pair of leads which are clipped onto appropriately numbered strips on the interface.

Once configured this can be marked onto a Quick Reference Programming Card for storing with the game. As the programming is not power dependent the interface can be immediately used when next switched on.

The keyboard remains fully functional and can be used simultaneously with the joystick.

An integral rear expansion connecter means there is no need to remove the interface to connect other peripherals.

NB A recent design improvement now means that the AGF Programmable interface works with the new Quickshot II rapid "Auto Fire" feature.



KEY FEATURES

* Programmable design gives TOTAL software support.
* Accepts Atari, Competition Pro Wico Starfighter Quick Shot, Le Stick etc.
* Rear extension connector for all other add-ons.
* Free demo program and instructions.

PACKAGE CONTENTS SUPPLIED

- Programmable Interface Module as illustrated, complete with clip-on programming leads.
- Self adhesive programming chart detailing how to define which key is simulated by UP DOWN LEFT RIGHT and FIRE.
- One pack of ten Quick Reference Programming Cards for at-a-glance setting to your games requirements.
- 12 months guarantee and full written instructions

ONLY **16.95** +£1 P&P

Quickshot II® Joystick

NEW IMPROVED GRIP: BUILT IN STABILIZING SUCTION CUPS

TRIGGER FIRE BUTTON: RAPID AUTO FIRE SWITCH: TOP FIRE BUTTON

FROM MR/MRS/MISS			
ADDRESS			
SEND C.W.O. (NO STAMP NEEDED) TO A.G.F. HARDWARE, DEPT PW.			
FREEPOST BOGNOR REGIS, WEST SUSSEX, PO22 9BR			
QTY	ITEM	ITEM PRICE	TOTAL
	PROGRAMMABLE INTERFACE	27.95	
	JOYSTICK(S)	17.95	
	PACK(S) QUICK REFERENCE CARDS	1.00	
ZX81 ☐ ZX SPECTRUM ☐ Please tick *DEALER ENQUIRIES WELCOME* *EXPORT PRICES ON APPLICATION*		FINAL TOTAL	

TURN YOUR PROGRAMME UPSIDE DOWN

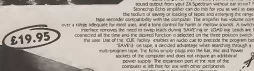
Now you can add another dimension to your games. Swap direction, swap functions, confuse your friends. In fact you can add almost any twist to your games with Stonechip's Programmable Joystick Interface.

You can also listen to them with Stonechip's Echo Amplifier.

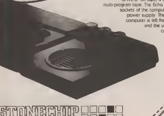


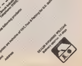
Programmable Joystick Interface This also enables any Spectrum software to be used with a joystick, irrespective of which keyboard keys have been chosen for function

Programming is easy using only a single switch Switch one way to program and another way to play No tapes to load or links to worry about — all programming is achieved by hardware Used with Atari-compatible joysticks Simply plugs into rear expansion port of ZX Spectrum No other connections to make, no additional power supply required



Echo Amplifier How would you like to listen to the sound output from your ZX Spectrum without ear strain? The Stonechip Echo amplifier can do this for you as well as easing the tedium of saving or loading of tapes and enlarging the range of tape recorder compatibility with the computer The amplifier has volume control over a range adequate for most uses, and a tone control for harsh or mellow sounds A switched interface removes the need to swap leads during 'SAVE'ing or 'LOAD'ing Leads are left connected all the time and the desired function is selected on the three position switch by the user Use of the 'CUE' facility enables an audio cue to precede the program being 'SAVE'd on tape, a decided advantage when searching through a multi-program tape. The Echo simply plugs into the Ear, Mic and Power sockets of the computer and does not require an additional power supply The expansion port at the rear of the computer is left free for use with other peripherals and the unit is housed in an attractive case custom designed to complement the ZX Spectrum





Heated exchange

***Robert Crook** presents the second part of a program for calculating the effects of heat*

Last week we looked at a fairly simple problem involving heat calculations, this following problem is more difficult

What mass of steam must be condensed in 500g of water contained in a calorimeter of mass 200g and specific heat capacity 840 J/Kg deg C to raise the water from its initial temperature to its boiling point?

The initial temperature of the steam is 100 deg C

The initial temperature of the water is 20 deg C

To solve this problem input the following information in the correct order

0.2	(Mass of container is given)
RETURN	(We are not told what the container is made of)
WATER	
RETURN	(The water undergoes no physical change)
20	
100	
F	(Here we can ask the computer to find the temperature range)
0.5	(There is 500g of water present)
G	(We can tell the computer to look up this value)
840	(We are told that this is the specific heat capacity of the container)
STEAM	(This is the name of the additional substance)
F	(The purpose of the question is to find the mass of steam used)
100	(The initial temperature of the steam is 100 deg C)
G	(This tells the computer to get the value for the Sp Ht C – in this case it will put in the value for that of water because after condensing the steam will turn into water)
F	(Find the heat energy lost and gained in this experiment)
RETURN	
RETURN	
G	
RETURN	

Note when the computer asked for the specific heat capacity of the container you could not have entered *G* for Get value This is because the material from which the container was made is unknown.

```
1270DEFPROCMCTMCT
1280IF B$(5)()"F" AND [illegible]
     AND B$(13)()"" [illegible](13) THEN
     PROCNOCHANGE:[illegible]
1290IF B$(5)()"F" AND B$(8)()"F" AND B$(13)()[illegible]
     THEN 1720
1300IF B$(6)()"F" THEN 1430
1310A=-(A(1)*A(10))
1320B=-(A(8)*A(9))
1330C=(A(12)*A(16))
1340D=-(A[illegible])*A(10))*A(5)
1350E=(A(8)*A(9))*A(5)
1360IF A(5))A(12) THEN F=(A(8)*A(18)):G=(A(12)
     *A[illegible]):H=0:I=0
1370IF A(5)(A(5) THEN H=(A(8)*A(15)):I=(A(12)
     *A(16)):F=0:G=0
1380J=(A(12)*A(16)*A[illegible])
1390IF A(5))A(12) THEN FT=(D [illegible] F+D+J)/(A+B-C)
     ELSE T=(D+E-H+I-J)/(C-A-B)
1400PROCONISE
1410PRINTA$[illegible] IFT:A(6)=FT B$(6)
1420IF A(15)=0 OR B$(15)="F" THEN A(15)=ABS
     (C*A(6)*B+I+J):PRINTA$(15)[illegible]"=";A(15)
1430IF [illegible]$(5)() F THEN 15[illegible]
14[illegible]A=(A(8)*A(5)):B=(A[illegible]*A(10))
1450C=-(A(8)*A(9)*[illegible])
1460D=-(A(1)*A(1[illegible])*A(6))
1470IF A(6)) [illegible] THEN E=(A(12)*[illegible])*(A(6)-A
     (1[illegible])) E[illegible] E=(A(12)*A(16)*(A(1[illegible])-A(6)[illegible])
1480IF A(6))A(13) THEN F=(A(8)*A(18)) G=(A(1[illegible])
     *A(19)):H=0:I=0
1490IF A(1[illegible])(A(6) THEN H=(A(8)*[illegible]):I=(A(12)
     *A(16)):F=0:G=0
1500 [illegible] A(6))A(13) THEN [illegible] -D+E-F+G)/(A+B)
     ELSE IT (C+D+E-H+I)/([illegible] A-B)
1510PRINTA$(5[illegible] IT A(5)=IT:B$(5)
1520IF A(1[illegible])=0 OR B$(15)= F THEN A(15)=ABS(E*G+I)
     :PRINTA$(15); = ;A(15)
[illegible]IF B$(1[illegible])()"F" T[illegible]N 7[illegible]
1540IF A(5)(A(6 [illegible]EN 16[illegible]
1550A=(A(8)*A(9)*(A(5)-A(6)))
1560B=(A(1)*A(10)*(A(5)-A(6)))
1570C=-(A(1[illegible])*A(14)*A(6))
1580D=-(A(1[illegible])*A(14))
1590E=-(A(8)*A(18))
1600F=(A(1[illegible])*A(15)
1610[illegible]=0:H=0
1620GOTO 1590
1630A=(A(8)*A(9)*(A(6)-A(5)))
1640B=-[illegible](1)*A(10)*(A(6)-A(5)))
1650L=-(A(1[illegible])*A(14)*A(6))
1660D=(A(12)*A(14))
1670G=(A(8)*A(19)):H=-(A(1[illegible])*A(18)
1680E=0:F=0
1690IF A(5))A(6) THEN A(1[illegible])=(A+E[illegible]-F)/D ELSE
     A(1[illegible])=(A+B C+G H)/D
1700PRINTA$(13)[illegible]A(1[illegible]);B$(1[illegible])
1710IF A(15)=0 OR B$(15)="F" THEN A(15)=ABS
     (A+B+E+G):PRINTA$(15); = ;A(15);B$(15)="
1720C(1)=A(1)*A(10)*A(7)
1730C(2)=A(8)*A(9)*A(7)
1740C(3)[illegible](19)
1750C(4)[illegible](19)
1760D(1)[illegible](14)*ABS(A(13)-A(6))
1770D(2)[illegible]A(19)
1780D(3)=A(12)*A(19)
1790IF B$(3)()"ICE" AND B$(4)()"ICE" THEN C(3)=0
1800IF B$(3)()"STEAM" AND B$(4)()"STEAM"
     THEN C(4)=0
1810IF B$(11)()"STEAM" THEN D(3)=0
1820IF B$(11)()"ICE" THEN D(2)=0
1840IF B$(18)="F" AND B$(11)() STEAM" THEN 1520
1850IF B$(19)="F" AND B$(11)() ICE" THEN 1920
1860T=C(1)+C(2)+C(3)+C(4)
1870IF B$(12)="F" THEN A(12)=T/(D(1)+D(2)+D(3))
     :PRINTA$(12);"=";A(12)
1880IF B$(14)="F" THEN A(14)=(T-D(2)-D(3))/D(1):
     PRINTA$(14);"=";A(14)
1890IF B$(18)="F" THEN A(18)=(T-D(1)-D(2))/D(3)
     :PRINTA$(18);"=";A(18)
1900IF B$(19)="F" THEN A(19)=(T-D(1)-D(3))/D(2):
     PRINTA$(19);"=";A(19)
1910GOTO 2020
1920IF B$(18)="F" THEN D(3)=0
1930IF B$(19)="F" THEN D(2)=0
1940T=D(1)+D(2)+D(3)
1950IF B$(1)="F" THEN A(1)=(T-C(2)-C(3)-C(4))
     /C(1):PRINTA$(1);"=";A(1)
1960IF B$(10)="F" THEN A(10)=(T-C(2)-C(3)-C(4))
     /C(1):PRINTA$(10);"=";A(10)
1970IF B$(7)="F" THEN A(7)=(T-C(3)-C(4))/
     (C(1)+C(2)):PRINTA$(7);"=";A(7)
1980IF B$(8)="F" THEN A(8)=(T-C(1)-C(4))/(C(2)
     +C(3)):PRINTA$(8);"=";A(8)
1990IF B$(9)="F" THEN A(9)=(T-C(1)-C(3)-C(4))
     /C(2):PRINTA$(9);"=";A(9)
2000IF B$(18)="F" THEN A(18)=(T-C(1)-C(2)-C(3))
     /C(4):PRINTA$(18);"=";A(18)
2010IF B$(19)="F" THEN A(19)=(T-C(1)-C(2)-C(4))
     /C(3):PRINTA$(15);"=";A(19)
2020ENDPROC
2030DEFPROCTEMPERATURE
2040IF B$(7)()"" AND B$(7)()"F" THEN PRINTA$(7)
     ;"=";A(7):GOTO 2060
2050IF B$(6)()"F" AND B$(5)()"F" AND A(6)(1999
     AND A(5)(1999 THEN A(7)=ABS(A(6)
     -A(5)):PRINTA$(7);"=";A(7)
2060IF B$(6)()"F" AND B$(5)="F" AND B$(7)()""
     THEN A(5)=A(6)-A(7):PRINTA$(5);"=";A(5)
2070IF B$(6)="F" AND B$(5)()"F" THEN A(6)=A(5)
     +A(7):PRINTA$(6);"=";A(6)
2080ENDPROC
2090DEFPROCNOCHANGE
2100PRINT"The temperatures are the same There
     will be no heat transfer"
2110PRINT"The final temperature of the mixture
     will be the temperature"
2120PRINT"of both the substances:";A(5);"
     degrees C."
```

```
2130ENDPROC
2140DEFPROCSTART
2150PRINT TAB(0,5)CHR$(141);CHR$(131)"
    Physics Heat Calculations "
2160PRINT TAB(0,6)CHR$(141);CHR$(131)"
    Physics Heat Calculations "
2170PRINTCHR$(141);CHR$(131)"
    Copyright (c) 1984       "
2180PRINTCHR$(141);CHR$(131)"
    Copyright (c) 1984       "
2190PRINTCHR$(141);CHR$(131)"
    By R Crook
2200PRINTCHR$(141);CHR$(131)"
    By R.Crook
2210FOR X%=0 TO 7:PRINTTAB(37-X%,3)CHR$
    (146);CHR$(252);:NEXT
2220FOR X%=0 TO 7:PRINTTAB(37-X%,14)CHR$
    (146);CHR$(252);:NEXT
2230A=GET
2240ENDPROC
2250DEFPROCNORISE
2260IF FT<0 THEN PRINT "There is not enough heat
      energy to cause a temperature rise"
2270ENDPROC
2280DEFPROCALTER
2290@%=&10
2300FOR A%=1 TO 15
2310IF B$(A%)=  AND A(A%)<>0 THEN B$(A%)= F
2320IF A%<10 THEN G$="  ELSE G$=
2330PRINTCHR$(131);A%;": ";G$ A$(A%); AB(31)
    CHR$(1 4);B$(A%)
2330NEXT
2340VDU 28,0,24,38 20
2350CLS:PRINTCHR$(17);"Which one to alter  ?
2360INPUT    Y:PRINTCHR$(130);A$(Y); - 1
2370INPUT B$(Y)
2380IF Y=2 OR Y=3 OR Y=11 THEN PROCCALCNUM
2390PRINTCHR$(130)"Change another(Y/N)
2400C$=GET$:IF C$<>"Y" AND C$<>"N" THEN 2400
      ELSE IF C$="Y" THEN 2350
2410VDU 26
2420FOR A%=1 TO 15
2430A(A%)=VAL(B$(A%))
2440IF B$(A%)="F" AND A%<>5 AND A%<>15 AND A%<>13
      THEN A(A%)=1
2450NEXT
2460ENDPROC
2470DEFPROCGET(L%)
2480IF L%=10 THEN I$="2260000
2490IF L%=15 THEN I$="376000
2500IF L%=9 THEN I$=B$(3)
2510IF L%=10THEN I$=B$(2)
2520IF L%=14THEN I$=B$(11)
2530IF L%=9 THEN PROCDATA(I$,L%
2540IF L%=10 THEN PROCDATA(I$,L%)
2550IF L%=14 THEN PROCDATA(I$,L%)
2560ENDPROC
2570DEFPROCCALCNUM
2580IF Y=2 THEN PROCGET(10)
2590IF Y=3 THEN PROCGET(9)
2600IF Y=11 THEN PROCGET(14)
2610ENDPROC
2620END
2630CLS
2640IF ERR=17 THEN END
2650PRINTTAB(6,8)CHR$(1 4) T  are unknown"
2660PRINT TAB(10,10)CHR$ |"  Press any key "
2670D=GET
2680RUN
```



The sound of music

Richard Berton presents a program to demonstrate the facilities of the SID chip

This program is written for the Commodore 64 and demonstrates all the facilities of the SID chip. Upon Running, the program immediately defaults to a continuous major chord which can be Reset at any time during the running of the program. Several menus are available from which the user can select many options for sound manipulation.

The three SID chip voices can be selected, either wholly or in part only, and the pitches can be selected either from the keyboard, or by external control via an analogue joystick. Likewise, on all other "controllable" or variable sound parameters control can be either from keyboard or joystick.

The program is easy to operate and in addition to the three voice pitches, full control is available for waveform selection, pulse width, ring-modulator, full filtering and special control of one voice by another etc.

When Run with the sound output connected to an amplifier, especially with reverberation effect, the result is pretty impressive. I Run this program through a 60 watt power amplifier!

The listing is structured and quite self explanatory. I have used Rems to clarify the various sections of the program.

NB This program will be continued next week.

```
1 REM SID CHIP DEMO (CBM 64)
2 REM RICHARD BARTON 1984
3 PRINT"J"
4 POKE53281,1
5 REM PRESET TO HAVE A CHORD ########
6 H1=8 L1=97 H2=10 L2=143 H3=25 L3=30 W1=17 W2=17 W3=17
  R0=8 RE=1
7 FN=0
8 FORI=1TO28 POKE54272+I,0 NEXTI REM    ZERO ALL ADDRESSES
  IN SID CHIP
10 POKE54296,(15+FN+22) REM SET VOLUME FILTER MODES/V3 DISABLE
20 POKE54277,190 POKE54278,240 REM ADSR (VOICE ONE)
21 POKE54284,190 POKE54285,240 REM ADSR (VOICE TWO)
22 POKE54291,190 POKE54292,240 REM ADSR (VOICE THREE)
23 IFXD=0ANDU1=0ANDU3=0THENPOKE54293,0 POKE54294,A REM
  C/O FILTER
24 IFXD=1THENPOKE54293,PEEK(54298) POKE54294,PEEK(54298)
  REM EXTERNAL CONTROL
25 IFC3=1THENPOKE54293,PEEK(54299) POKE54294,PEEK(54299)
  REM FILT CNTL BY V3
27 IFU3=1THENPOKE54293,PEEK(54300) POKE54294,PEEK(54300)
  REM FILT.CNTL BY ENV3
29 POKE54295,(7+RE) REM RESONANCE FILTER
30 IFD1=0THENPOKE54275,J1 POKE54274,K1 REM DUTY
  CYCLE - VOICE ONE
31 IFD2=0THENPOKE54282,J2 POKE54281,K2 REM DUTY CYCLE -
  VOICE TWO
32 IFD3=0THENPOKE54289,J3 POKE54288,K3 REM DUTY CYCLE -
  VOICE THREE
33 IFB1=1THENPOKE54275,PEEK(54298)/15 POKE54274,PEEK(54298)
  REM EX PULSEV1
34 IFD2=1THENPOKE54282,PEEK(54298)/15 POKE54281,PEEK(54298)
  REM EX PULSEV2
35 IFD3=1THENPOKE54289,PEEK(54298)/15 POKE54288,PEEK(54298)
  REM EX.PULSEV3
39 IFXA=0ANDC1=0ANDG1=0THENPOKE54273,H1 POKE54272,L1 REM
  VOICE ONE PITCH
40 IFXB=0ANDC2=0ANDG2=0THENPOKE54280,H2 POKE54279,L2 REM
  VOICE TWO PITCH
44 IFXC=0ANDU3=0THENPOKE54287,H3 POKE54286,L3 REM VOICE
  THREE PITCH
45 IFXA=1THENPOKE54273,PEEK(54297) POKE54272,PEEK(54297)
  REM EXT.CNTRL(VOICE1)
46 IFXB=1THENPOKE54280,PEEK(54297) POKE54279,PEEK(54297)
  REM EXT.CNTRL(VOICE2)
47 IFXC=1THENPOKE54287,PEEK(54297) POKE54286,PEEK(54297) REM
  EXT CNTRL(VOICE3)
48 IFC1=1THENPOKE54273,PEEK(54299) POKE54272,PEEK(54299)
  REM CNTL FROM3(VOICE1)
49 IFC2=1THENPOKE54280,PEEK(54299) POKE54279,PEEK(54299)
  REM CNTL FROM3(VOICE2)
50 IFG1=1THENPOKE54273,PEEK(54300) POKE54272,PEEK(54300)
  REM V1 CNTL BY V3
52 IFG2=1THENPOKE54280,PEEK(54300) POKE54279,PEEK(54300)
  REM V2 CNTL BY V3
59 POKE54276,W1+R0+S1 POKE54283,W2+R0+S2 POKE54290,W3+R0+S3
60 GOSUB1000 GOTO10
1000 REM (--) DISPLAY ##########
1010 PRINT"SOUND GENERATOR CHIP EXPERIMENTS"   R BARTON84
1020 PRINT"MENU SELECTION
1030 PRINT"SELECT CONTROL FROM FOLLOWING -
1040 PRINT" 1 ← VOICE ONE PITCH
1050 PRINT" 2 ← VOICE TWO PITCH"
1060 PRINT" 3 ← VOICE THREE PITCH
1070 PRINT" 4 ← VOICE ONE WAVEFORM
1080 PRINT" 5 ← VOICE TWO WAVEFORM"
1090 PRINT" 6 ← VOICE THREE WAVEFORM
1200 PRINT" 7 ← ALL VOICE FILTERS"
1210 PRINT" 8 ← ALL VOICE RING MOD."
1220 PRINT" 9 ← SECTION TWO MENU"
1225 PRINT" , ← VIEW ALL CURRENT VALUES SET
1227 PRINT" R ← COMPLETE RESET OF ALL VALUES"
1230 PRINT"
1240 PRINT"WHEN SELECTING EXTERNAL CONTROL
  (WHERE AVAILABLE)
1250 PRINT"A SET OF GAMES PADDLE, OR AN ANALOGUE JOYSTICK
  SHOULD BE PLUGGED"
1260 PRINT"INTO CONTROL PORT 1"
2000 GETA$ IFA$=""THENRETURN
2003 IFA$="," THEN40000
2004 IFA$="R"THEN50000
2006 IFASC(A$)>57THEN2000
2008 A=VAL(A$)
2009 PRINTCHR$(147)
2010 ONAGOTO4000,6000,8000,10000,12000,14000,16000,
  18000,20000
4000 REM ##########################
4010 REM VOICE ONE PITCH CONTROL
4020 REM ##########################
4030 PRINT"SOUND GENERATOR CHIP EXPERIMENTS"
4040 PRINT"VOICE ONE PITCH CONTROL          RB84"
4050 INPUT"INPUT HIGH CODE=";H1
4060 INPUT"LOW CODE";L1
4065 [illegible]
4070 PRINTCHR$(147) RETURN
6000 REM ##########################
6010 REM VOICE TWO PITCH CONTROL
6020 REM ##########################
6030 PRINT"SOUND GENERATOR CHIP EXPERIMENTS"
6040 PRINT"VOICE TWO PITCH CONTROL          RB84"
6050 INPUT"HIGH CODE=";H2
6060 INPUT"LOW CODE=";L2
6065 INPUT"EXTERNAL CONTROL(1=YES 0=NO)";XB
6070 PRINTCHR$(147) RETURN
8000 REM ##########################
8010 REM VOICE THREE PITCH CONTROL
8020 REM ##########################
8030 PRINT"SOUND GENERATOR CHIP EXPERIMENTS
8040 PRINT"VOICE THREE PITCH CONTROL        RB84"
8050 INPUT"HIGH CODE=";H3
8060 INPUT"LOW CODE=";L3
8065 INPUT"EXTERNAL CONTROL(1=YES/0=NO)"
8070 PRINTCHR$(147) RETURN
10000 REM ##################
10010 REM VOICE ONE WAVEFORM
10020 REM ##################
10030 PRINT"SOUND GENERATOR CHIP EXPERIMENTS"
```

continued on page 35

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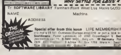
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Home Computer Centre

PC Wk

```
10040 PRINT" VOICE ONE WAVEFORM CONTROL         R004 "
10045 PRINT" CODES ARE 17-33-65-129"
10050 INPUT" INPUT WAVE CODE- ";W
10051 IF [illegible] AND W1<>33ANDW1<>65ANDW1<>129THENPR[illegible]
      GOTO10050
10052 IF W1=65THEN10070
10054 PRINT" INPUT DUTY CYCLE REQUIRED-"
10056 INPUT "ENTER HI CODE (0-15)-";J1
10057 IFJ1>15THENPRINT"" GOTO10056
10058 INPUT"ENTER LO CODE (0-255)-";K1
10060 IFK1>255THENPRINT"" GOTO10058
10065 INPUT "EXTERNAL CONTROL (1=YES/0=NO)-";[illegible]
10070 PRINTCHR$(14) RETURN
12000 REM ****************
12010 REM VOICE "TWO WAVEFORM"
12020 REM ****************
12030 PRINT" SOUND GENERATOR CHIP EXPERIMENTS"
12040 PRINT" VOICE TWO WAVEFORM CONTROL         R004 "
12045 PRINT" CODES ARE 17-33-65-129"
12050 INPUT" INPUT WAVE CODE- ";W2
12051 IFW2<>17ANDW2<>33ANDW2<>65ANDW2<>129THENPRINT"",
      GOTO12050
12052 IFW2=65THEN12070
12054 PRINT" INPUT DUTY CYCLE REQUIRED-"
12056 INPUT "ENTER HI CODE (0-15)-";J2
12057 IFJ2>15THENPRINT"" GOTO12056
12058 INPUT "ENTER LO CODE (0-255)-";K2
12060 IFK2>255THENPRINT"" GOTO12058
12065 INPUT "EXTERNAL CONTROL(1=YES/0=NO)-";[illegible]2
12070 PRINTCHR$(14); RETURN
14000 REM ****************
14010 REM VOICE THREE WAVEFORM
14020 REM ****************
14030 PRINT" SOUND GENERATOR CHIP EXPERIMENTS"
14040 PRINT" VOICE THREE WAVEFORM CONTROL       R004 "
14045 PRINT" CODES ARE 17-33-65-129"
14050 INPUT" INPUT WAVE CODE- ";W3
14051 IFW3<>17ANDW3<>33ANDW3<>65ANDW3<>129THENPRINT"",
      GOTO14050
14052 IFW3=65THEN[illegible]
14054 PRINT" INPUT DUTY CYCLE [illegible]
14056 INPUT "ENTER HI CODE (0-[illegible]
14057 IF [illegible] PRINT"" GOTO[illegible]
14059 INPUT "ENTER LO CODE (0-255)-";K[illegible]
14060 IFK3>255THENPRINT"" GOTO14059
14065 INPUT "EXTERNAL CONTROL (1=YES/0=NO)[illegible]
14070 PRINTCHR$(14); RETURN
16000 REM ****************
16010 REM ALL VOICE FILTER
16020 REM ****************
16030 PRINT" SOUND GENERATOR CHIP [illegible] MENTS"
16040 PRINT" FILTER CONTROL                      R004 "
16045 INPUT "INPUT HIGH CODE-";G
16046 INPUT " LOW CODE-";R
16048 INPUT "EXTERNAL CONTROL(1=YES/0=NO)-";[illegible]
16049 IF[illegible]THENPRINT"" GOTO16048
16050 INPUT "TYPE OF FILTER(L/H/N/[illegible])";FR$ GOTO16055
16053 PRINT"" [illegible]16050
16055 IFFR$<>"L"AND[illegible]"B"ANDFR$<>"H"ANDFR$<>"N"ANDFR$<>
      "[illegible]"THEN16053
16058 IFFR$="[illegible]"THEN[illegible]PRINTCHR$(14)[illegible]GOTO10
16060 IFFR$="L"THENF=16
16062 IFFR$="B"THENF=32
16064 IFFR$="H"THENF=64
16065 IFFR$="N"THENF=80
16080 INPUT "[illegible] SETTING (1-15)";RS
16081 IFRS<1ORRS>15THENPRINT""[illegible]16080
16082 REM [illegible]
16190 PRINTCHR$(14); GOTO10
18000 REM ****************
18010 REM [illegible]
18020 REM ****************
18030 PRINT" SOUND GENERATOR CHIP EXPERIMENTS"
18040 PRINT" [illegible] CONTROL                 R004 "
18050 INPUT [illegible] OSCILLATOR (1=YES/0=NO)[illegible]
```

continued next week

Open Forum

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

Submarine Mission

on Dragon 32

This program for the Dragon uses just over 6K in PMODE 3. The idea of the game is to guide your submarine through the underground cavern steering clear of the debris from depth charge explosions and minefields.

The program constantly reads data which is terminated by XXX. Ships, planes, minefields and subs are called by SH, PL, MI, SU respectively. The data line can easily be extended and changed to suit your tastes and skills.

To change the data or add to it line 390 must also be changed as this line skips the first set of data in order to read in the machine code routine for the explosion.

Every item of data added to lines 580-590 must be added to 143 in line 930. Ie, if 2 items of data were added to line 580 then line 930 should be edited so the 143 = 143 + 2 giving 145. The line should then read - 930 FOR D=1 TO 145:READ A$:NEXT FOR A=31712 TO 31712+51

Program notes

60-110 Sets up variables and clears space for machine code.
130 Pokes machine code scroll routine into memory
220-270 Instructions and speed choice
300-380 Definitions.
390-560 Main loop
570-590 Data lines.
620-650 Torpedo routine
660-880 Ship, plane, sub and mine routines.
890 Explosion routine
910 Blown up routine
930-970 Pokes machine code into memory

SUBMARNE MISSION.

BY JONATHAN HALE COPYRIGHT (C) 1983.

```
10 '****************************
20 '*SUBMARINE MISSION (C) 1983 *
30 '*COPYRIGHT BY J HALE 1/8/83*
40 '[illegible]
50 '****************************
60 PCLEAR4
70 PMODE3:PCLS:SCREEN 1,0:COLOR 4,1
80 CLEAR 300,31300
90 P=31300
100 [illegible]
110 [illegible]
120 [illegible]
130 [illegible]
140 [illegible]
150 [illegible]
160 [illegible]
170 PRINT@485,"PRESS ANY KEY";:EXEC41194
180 [illegible]
190 [illegible]
200 [illegible]
210 [illegible]
220 CLS:PRINT@8,"INSTRUCTIONS"
230 [illegible]
240 PRINT@485,"PRESS ANY KEY";:EXEC41194
250 [illegible]
260 [illegible]
270 [illegible]
280 SCREEN 1,0
290 [illegible]
300 [illegible]
310 [illegible]
320 [illegible]
330 [illegible]
340 [illegible]
350 [illegible]
360 [illegible]
370 [illegible]
380 ' MAIN LOOP
390 [illegible]
400 [illegible]
410 READ X$
420 [illegible]
430 [illegible]
440 [illegible]
450 [illegible]
460 [illegible]
470 [illegible]
480 [illegible]
490 [illegible]
500 [illegible]
510 [illegible]
520 [illegible]
530 [illegible]
540 [illegible]
```

```
[illegible]
```

Submarine Mission

by Jonathan Hale

Dodgem

on Spectrum

This program will run on the 16 or 14K machines In this game you must guide your car between the tyres You lose points if you do not move left or right If you get 200 points you have completed your mission

Keys 4 - left

5 - right

Program notes

10-130	Defining variables and positions for tyres
200-270	Main loop Checking if you have hit anything and updating your position
260	Scrolling instruction for tyres
300-320	Inputting
350-370	Death routine
400-420	Successful mission routine
600-640	Graphics
Tyres	Graphic A
Car	Graphic B

```
  10 LET b=1  LET h=18
  20 BORDER 1  PAPER 5  INK 1  C
LS
  30 GO SUB 300
  35 LET k=1
  40 LET sc=0
  45 GO SUB 600
 100 DIM a(50)
 110 FOR n=1 TO 50
 120 LET a(n)=INT (RND*15)
 130 NEXT n
 200 FOR n=1 TO 50
 210 PRINT INK 0; PAPER 5;AT 21,
a(n)+5,"[illegible]"
 215 PRINT INK 0, PAPER 5,AT 21,
7,"[illegible]",AT 21,24,"[illegible]"
 220 PRINT AT b+5,h,"[illegible]"
 225 PRINT AT b+5,h+k," "
 227 LET k=0
 230 IF INKEY$<>"4" THEN LET h=h
+1  LET k=k-1
 233 IF INKEY$<>"5" THEN LET h=h
-1  LET k=k+1
 235 IF sc=200 THEN GO TO 400
 237 IF INKEY$="" THEN LET sc=sc
-1
 240 IF ATTR (b+7,h)=40 THEN GO
TO 350
 243 IF INKEY$="" THEN LET k=0
 245 LET sc=sc+1
 250 RANDOMIZE USR 3280
 260 NEXT n
 270 GO TO 200
 300 INPUT "Input difficulty (1-
10)",b
```

Open Forum

```
 310 IF b>10 OR b<1 THEN GO TO 3
00
 320 RETURN
 300 PRINT AT 10,3;"YOU      AR
E    DEAD"
 300 PRINT AT 11,3;"YOU    SCORE
D    ";sc
 361 FOR n=0 TO 200: NEXT n
 365 PAUSE 100
 370 GO TO 10
 400 FOR n=-20 TO 20· BEEP .1,n:
NEXT n
 410 CLS · PRINT AT 10,5;"MISSIO
N  ACCOMPLISHED"
 420 PAUSE 200: GO TO 10
 600 RESTORE . FOR n=0 TO 7: REA
D a: POKE USR "a"+n,a: NEXT n
 610 DATA 60,126,266,231,231,266
,126,60
 620 FOR n=0 TO 7: READ a: POKE
USR "b"+n,a. NEXT n
 630 DATA 126,190,126,126,126,90
,102,126
 640 RETURN
```

Dodgem
by Clifton Pointon

Cube Root

on BBC

The BBC and most similar computers have no Cube Root function and this decimal search program overcomes that problem. It prints the whole search on the screen, but taking out line 130 would make it only print the answer

Program notes

10 – 20 The name of a proud BBC user
30 Puts the Beeb into an 80-column mode (easier for reading the numbers once the numbers become "long")
40 Same effect as Ctrl "N" — Prevents screen from scrolling. SHIFT must be pressed to move on
50 Gets the number to be "worked on"
60 Shows that the computer has begun its job
70–110 The mathematical part
120 If the root has been found this prints it on the screen
130 Shows the workings out, and the basis of decimal search
140 Returns to the loop

```
10 REM Decimal Search

20 REM By Sunil Singh

30 MODE 3

40 VDU 14

50 INPUT "The number "x

60 PRINT "The Cube Root of ",x," is"

70 A=0

80 B=x

90 C=A+(B-A)/2

100 IF x > C↑3 THEN A=C

110 IF x < C↑3 THEN B=C

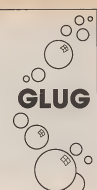
120 IF x = C↑3 THEN PRINT "The Cube Root is ",C END

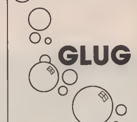
130 PRINT C,"↑ 3=",C↑3,A," < x < ",B

140 GOTO 90
```

By changing the powers in lines 60,100,110,120 and 130 this program could work out any root from Square root to the Nth root.

Cube Root
by S Singh


GLUG


GLUG

Open Forum

Patterns

on Spectrum

These routines produce patterns using *POKES*. The first one enables you to see the *POKES* addresses and what they do. The other program fills the screen with one colour and then covers over it in another colour. This produces good effects. Sometimes you can get 4 colours flashing onto the screen at once.

One routine produces set patterns using data to arrange the data for other patterns. Remember, leave the last figure on the Data line as 21. One routine fills the screen with random coloured blocks, some flash some don't. All the routines print on the bottom two lines which usually can't be printed on.

```
  10 FOR a=23007 TO 20511 STEP -
1
  20 READ n
  21 IF n=21 THEN RESTORE
  30 POKE a,n
  40 DATA 12,76,200,255,56,23,30
,12,75,106,200,23,85,10,21
  60 NEXT a
9005 GO TO 9000

   1 BORDER 0
  10 FOR b=1 TO 255 STEP 10
  15 FOR a=23306 TO 22526 STEP -
1
  20 POKE a,b
  30 NEXT a
  35 NEXT b
  40 GO TO 1

  10 LET a=INT (RND*30000)
  20 LET b=INT (RND*256)
  22 PRINT a,,b
  30 PAUSE 0
  35 POKE a,b
  40 GO TO 10

   1 CLS
  10 FOR a=23297 TO 22489 STEP -
1
  20 POKE a,INT (RND*255)
  30 NEXT a
  40 GO TO 40
```

Patterns
by Thomas Hyde

Microradio

GW6JJN

Standard audiocode

Last week I spoke about the need for an Esperanto in computer terms — a language that different types of computer could use to communicate with each other. Radio enthusiasts will understand this need now that amateurs and broadcast stations can send computer programs over the air. The problem is simply that your mate has a BBC-B and you have a Commodore 64. With NOS *Basicode*, that is no longer a problem.

As far as Radio Netherlands were concerned, NOS *Basicode 2* was the answer. Now, through their overseas broadcasts, they share it with the world and programs have been received in Australia, USA, Canada, Sweden and Africa as well as the UK.

Each different type of computer not only uses different baud rates on the cassette interface, they also use different tones, frequencies and codes. NOS *Basicode* has established a standard audiocode that each computer has to be programmed with initially.

The *Basicode* specifications are as follows. Two tones are used to record data consisting of 1200 and 2400Hz. A logic '0' is defined as one full cycle of 1200Hz and a logic '1' is two full cycles of 2400Hz. The transmit rate is 1200 baud, consisting of 'bytes' that are made up of one startbit (logic 0), eight databits (least significant first) and two stopbits (logic 1). A cassette tape recording of a *Basicode* program will begin with a leader of five second of stopbit, hex 82 (Ascii) which signifies 'start text', then the basic information in Ascii and finally a checksum and an end trailer also consisting of five seconds of stopbit.

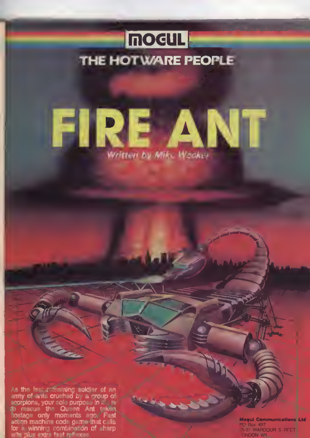
For the past few years, radio amateurs in the Netherlands have used *Basicode* to communicate over VHF and shortwave very successfully. With BBC Radio Four doing the same thing, radio-computing is going places. Among the computers that *Basicode* has been implemented on are Apple, BBC, all Commodores, CP/M, TRS80 and Video Genie, most of which are based on Microsoft Basic. Other machines will follow, including the Sinclair Spectrum.

The cost of the *Basicode* translation tape, which includes several programs and games in *Basicode*, as well as a book on the subject and an instruction guide, is 30 Dutch Guilders. Full details regarding *Basicode* can be obtained from *Hobbyscoop, PO Box 1200, Hilversum, The Netherlands*. Please do not send cash to this address — it is better to write to them for details and information before you make any orders.

Basicode was developed by the Dutch Radio Service in conjunction with the Dutch equivalent of the Open University.

Ray Berry GW6JJN

[illegible] If you have any queries [illegible] hints and tips [illegible] that you would like [illegible] write to Ray Berry, [illegible] *Popular Computing Weekly*, 12-13 Little Newport Street, [illegible] WC2R [illegible]


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Tony Bridge's Adventure Corner



Mission Impossible!

This week, some more problems, and (I hope) some help We ll start with some letters about Scott Adams adventures The first problem is from Alan McCullough, of Lisburn

As an avid reader of your magazine I have decided to ask for the assistance of your readers After reading your Adventure Corner, I decided to try my hand at adventure gaming, so obtained Scott Adams *Mission Impossible* for my trusty Vic Well, *Mission Impossible* it turned out to be! I was in difficulty right from the start I couldn t even remove the envelope from the table in the briefing room I moved on a bit further and spotted a key on a ledge but when I broke the window to get at it I started the final countdown

If you print this letter perhaps someone can come to my rescue I would appreciate hearing from anyone out there who has defused the bomb!

Can anyone help Alan? I think you might find the pail is very useful around the bomb — if in desperation, Alan try moving it!

Another Vic-er who is currently stuck in an Adams adventure is Joseph Klimkouski from Swindon This time it is *The Count* who is proving difficult Joseph is quite a way into the adventure but feels that he has more locations to visit yet (remembering the observations that a couple of readers made some time ago about the stairs and the roof)

A vent in the work room is a bit of a puzzle as is the bell-pull outside the castle Can anyone offer help on these problems? If the Count is being a bit naughty and nicking things Joseph try finding a dusty place where Dracula can t find you — you might get a good night s rest in this way!

M Valentine has sent a long letter informing me that he has "solved *Mission Impossible* in just 2 hours 5 minutes — and *Pirate s Cove* in a little under 2 hours Is this a record?

I m not, I must admit one of the "speedster" adventurers preferring instead to "smell the roses along the way" and listen to the butterflies in the field next door" In other words I would rather take my time and explore all the details and "wrinkles" of an adventure than rush through it, intent only on how to finish in the quickest possible time This really stems from my comments of some weeks ago about "atmosphere" in adventures If the program has this elusive quality I find myself gripped by the action

Mr Valentine cames on to list some of the adventures he has played on his Vic with a rating for each one This is an excellent idea that I would like to see more people take up Having read through this list see if you could draw up a similar one of adventures that you have enjoyed (or otherwise!), and write in to me and let us all know of your likes and dislikes

COLONEL S HOUSE (RABBIT) 6/10
Could be better!
TOMB OF DREWAN (AUDIOGENIC) 8/10
Good but a lot of time needed
STARSHIP ESCAPE (SUMLOCK) 3/10
Boredom sets in fairly quickly
THE DUNGEONS (ANIROG) 8/10
Graphics very good pity about the awkward method of buying goods after going inside the maze
QUEST (COSMA) 5/10
Too difficult (well I couldn t do it anyway!)
CRUSH CRUMBLE & CHOMP (EPYX) 10/10
Costs about £20 but WOW! what graphics! A very addictive game/adventure
THE VALLEY (ASP) 4/10
Not worth the effort
ALARIAN S REVENGE (WESSEXSOFT)
Same program as THE VALLEY
TRADER (PIXEL/QUICKSILVA) 7/10
Quite fun but not really worth £15

Scott Adams, author of *Mission Impossible The Count* and *Pirate's Cove*

MOON BASE ALPHA/COMPUTER ADVENTURE (RABBIT) 3/10
2×3 1/2K programs save your money for C C & C!
PHAROAH S TOMB (ANIROG) 6/10
Quite good graphically but needs a fluke to get past potholes
ZOK S KINGDOM (ANIROG) 6/10
See PHAROAH S KINGDOM
ORE (IMPACT) 6/10
Relies so much on chance

Thanks for those comments, Mr Valentine — I can t possibly see all the adventures available now (and I am always pleasantly surprised to see the sheer number of adventuring games released nowadays) and thus I have to rely on other adventurers to keep us informed of what they're playing (or hating!) In this way we can all hopefully make up our minds about which adventures we would like to purchase

Now for some more Hobbit Hall of Fame

Paul Shreeve with a score of 87 5 per cent on Spectrum and Commodore (clever clogs!) — interestingly enough Paul gets the same score with exactly the same solution on both machines Try using the Golden Key in the Magic door on the side of the mountain Paul, you may find that you get a few more points that way In the Spectrum version at least, you might find that you can "*Drop* the Treasure into the chest at the end If so the game will continue leaving you free to go back and do a bit of Goblin bashing (if you re clever you might be able to persuade a friend to use the Bard s bow and arrow to accomplish this! — this will amass the points)

The problem with Lake Town has often been mentioned by Spectrum owners On the subject of Bard s destinancy Jim Coyle gave me this little couplet that might be of some use

IF YOU TALK TO BARD AND BARD SAYS NO" YOU MUST TELL HIM WHERE TO GO

The authors seem to have applied a bit of their experience to the Commodore version and rounded the corners of the program a bit — thus the score are a bit more generous and the characters are on the whole not quite so unpredictable

To change the subject David Lloyd, who is stuck in *Aztec Tomb Adventure* will find that he needs to climb the house to find the plank of wood, which he will need to cross the river "I keep drowning on the rocks before I get to the Tomb! How do you get the boat onto the cliff-top? Perhaps someone out there knows!"

Michelle Warner who is 15, and didn t tell me her high score — Congratulations anyway Michelle! And finally for this week (there is a huge pile of names to be gone through yet they will have to wait for another week!) *Justin Eames*, of Winchester with 92 5 per cent

To round off this week s Corner (what pun?), a couple of problems and some help Lynne Brooke is playing *Aztec Tomb* that was mentioned in Paul Shreeve s letter I hope that the comment there was of some help Lynne She says that she has managed to catch a magical fish, which says "Plants need water" and then vanishes Can anyone tell her where the plants are and how to water them?

And to Alex Steele, of London E1 who is having trouble with *Voodoo Castle* one of the Scott Adams Adventures for the Vic 20 here is some help in the Lab

ATRR MYOT RHYE

Next week some more letters, and some more programs

This series of articles is designed for novice and experienced Adventurers alike Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter So if you have an Adventure you want reviewed or if you are stuck in an Adventure and cannot progress any further write to Tony Bridge Adventure Corner, *Popular Computing Weekly* 12 13 Little Newport Street, London WC2R 3LD



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SOUND EFFECTS

Malcolm Tallis of Woodhouse Lane, East Timperley, Cheshire writes

Q I am a very puzzled CGL M5 owner In the Basic I manual there is no mention of how to create music and sound effects, or how to use *Peek & Poke* for drawing dots and straight lines. Can you give me any help?

A The information you want is available If you write to the M5 product division at Computer Games Ltd, C G L House, Goldings Hill Loughton, Essex they will send you a free 16 page booklet with all the information you need While Basic I is not as comprehensive as Basic G, many of the functions are available in Basic I, usually by using *Pokes* The details are in the booklet

VIC20 UPGRADED

Shaun O Connor of Tyldesley Road, Atherton Manchester, writes

Q I own a Vic 20 computer and have heard that it is possible to obtain an expansion pack to upgrade it to a CBM 64 Could you tell me where the pack is available from, how much it will cost and who makes them?

A I have had several letters from disappointed Vic 20 owners, who want to know if any company does make this up-grade As far as I know the answer is no It is a pity, but you are faced with up-grading your Vic as far as it will go, or else getting rid of it and buying a CBM 64

SPECTRUM CONTACTS

G Orderly of Montview Park, Dundonald, Belfast writes

Q Please could you tell me of any computer clubs near me?

I have a Spectrum 48K.

A There is a computer club in Belfast that meets monthly at the Ashby Institute, Stranmillis Road Belfast 9 Meetings start at 7pm, and are on the first Monday of the month You can contact Patrick Roodie at Holywood 3212 for more details

Someone else who may well have contacts in your area are the International Sinclair User Group, who are based at 176 Todmorden Road, Burnley, Lancashire Please include an SAE if you write to them

SCANNING SYSTEM

Alun Perse of Bulfin Road, Dublin 8 Ireland, writes

Q I shall be going to America soon and I may buy another computer while I'm there (I have a 48K Spectrum). Now I know they use a different scanning system there, but could I not just open the case and replace the Pal modulator with an Ntsc one?

A I doubt it very much. Along with the changes inherent with a different modulator, there are changes as regards timing and screen definition With the Ntsc that means 100 less screen lines (525 as opposed to our 625) and 10 frames a second more (60Hz as opposed to our 50Hz)

I am afraid that you must either take a British television and transformer with you (but beware the FCC Regulations), or else you will have to buy another computer when you get there

SPRITELY VERSION

Christopher Sutherland of Kingsmills, Inverness, Scotland writes

Q On a computer running interrupt-based sprites, will the sprites on the American (60Hz) version be faster (ie. move more pixels per second), than a British (50Hz) version?

In other words, are games on the Commodore 64 faster in America than they are on the equivalent British machine?

A We are talking about small gains and losses here Yes as the American system uses 10 extra frames a second, if all else was equal, then they would be faster The trade-off is resolution Ntsc is a 525 line standard, ours 625 Thus, we will have slightly better resolution at the expense of a slightly slower speed The differences to some extent will depend on the internal hardware of the computer I have seen one game for an American computer used on its British counterpart which had annoying break-up lines constantly appearing and disappearing on the screen Certainly it did not stop the program being usable, but it was a nuisance

STACKED UP

Owen Robertson of Caerphilly, Wales writes

Q I am interested in the language Forth, but I have been told that I need to understand how a 'Stack' works Is this true, and could you tell me what a Stack is and how it works? I know it is for storing and 'working out', but what else?

A Understanding how a Stack works will be useful if you are going to take up Forth Essentially if you put the numbers two, three and four on a stack, and then wanted to use the two, for example, it would not be possible to just access the two You would have to move it to the top This can be done in various ways — you might use the two numbers above it — leaving just the two on the stack You might try to rotate so that a lower number is moved higher up

It is easier to manipulate the Stack in Forth than in Basic, which has no direct commands for using the Stack In Basic, you might try using some very carefully thought out *Peeks* and *Pokes* But you would be more likely to use machine code to *Push* and *Pop* numbers (you *Push* numbers on to the Stack, and *Pop* them off)

As for what a Stack is, well a register in a Cpu is a sort of stack Perhaps it is better described as a reserved area of Ram used for storing data. The kind of data it stores is the addresses of the various beginnings and endings of *Goto* and *Gosub* routines as well as such things as the number of repetitions in a *Fornext* loop

Most computers have a separate area called Workspace for such things as 'workings out' Depending on the computer you can usually see what the Stack is doing by using the command *Peek* at the addresses around the Stack Pointer, which is the name usually given to the flag systems variable that records the empty space in the Stack As a warning, do not try and *Poke* this variable unless you are very sure of what you are doing

One of the most creative hardware modifications I have ever come across has been sent in by Mrs A J Ekmas of Princes Mary Avenue Brompton, Gillingham, Kent, who writes 'Could you please print this letter for the benefit of Matthew Smith of Stourport on Severn and other Vic 20 owners My husband owns a Vic and has had the same problem of overheating He has now solved this problem by using Lego bricks (!) He made two simple stands from our two son's Lego set one for each end of the computer

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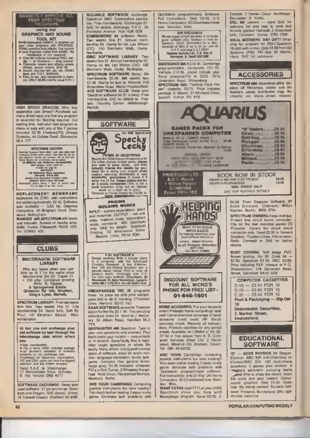
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BBC COMAMA 0305 Disc Drive with leads, manual plus 10 x 50 TR disc Contact J Watson (0274) 580606

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SWAP Adventureland Avenger cartridges for 8k memory expansion or sell for £7 each (VIC 20) Phone Seaford 890122 and ask for Martin Walker also Wacky Waiters swap for Night Flight.

WANTED COMMODORE 64 leads and manuals no tape recorder needed good working condition s/w also needed £100 £130 paid Tel 459 8043 (Andy)

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Micro *Vic 20*
Adventure *Adventureland*
Problem *How can you get or examine the object in the cave Also how do you blow up the bricked up window?*
Name *Paul Watkins*
Address *67 Saxonhurst Road Northbourne, Bournemouth Dorset BH10 6JE*

Micro *Spectrum*
Adventure *The Hobbit*
Problem. *Cannot get out of Goblin s Dungeons Cannot get past Bulbous eyes in forest*
Name *Tony Slater*
Address *Flat 3 87 Dunsmure Road London N16 5PT*

Micro *Sinclair ZX Spectrum 48K*
Adventure *Ship of Doom — Espionage Island*
Problem *I cannot melt the ice in Ship of Doom Also in Espionage Island I can t do anything on the dark corner or climb the rock face*
Name *Anthony Watson*
Address *6 Ennerdale Grove Farnworth Bolton Lancs BL4 0PX*

Micro *Vic 20 (Unexpanded)*
Adventure *Moon Base Alpha (Rabbit Software)*
Problem *How do I get the gloves which are contaminated with a deadly virus, to the autoclave without dying because I need them to pick a battery up Help!*
Name *Rene Oulten*
Address *Greyhound Cottages 1 Manor Road Woodford Bridge Essex IG8 8BU*

New Releases

ANY QUESTIONS

Computeristic Software is a new software company whose first software releases are basic educational programs for the Spectrum

The programs cover various subjects and age ranges and are straightforward question and answers with some facilities to help the child find the correct answers

All of the tapes are divided into two sections, the first already contains questions and answers, the second can be adapted to hold whatever questions you require via a simple inputting procedure

Program *Questor*
Price *£7 95*
Micro *Spectrum 48K*
Supplier *Computeristic Software*
205 Wells Road
Knowle
Bristol BS4 2DF

MERCENARY

Toppler is a version of the arcade game which mimics an arcade shooting gallery — you blast away at a steady stream of ducks using a limited supply of bullets

The game is in machine code and includes (aside from the unfortunate ducks) various other targets which can earn bonus points — the twist being you must avoid hitting them There is bonus screen in which you blitz Tommy the Tank by blowing off his three wheels — perhaps he's a duck mercenary? Cruel but addictive, like so much in life

Program *Toppler*
Price *£5 95*
Micro *Dragon 32*
Supplier *Orion Video Productions*
38 Trenham Road
Coventry CV1 5BD

CHILD'S PLAY

As yet there are few educational games and programs for the Commodore 64 — too tempting as a games machine perhaps One of the first is *Games for Children* by Softshop International

Four games are used to teach four different things addition, subtraction, spelling numbers and the alphabet All of the games are illustrated — I particularly liked the way the 'minus' figure was expressed in terms of a number of girls and boys zapped from a play ground

Versions of the program are available in several foreign languages, and for other machines including the Atmos and Spectrum

Program *Games for Children*
Price *£9 95*
Micro *Commodore 64*
Supplier *Soft Shop International*
Unit 301
16 Brune Street
London E1 7NJ

BBC LESSON

There's no doubt about it if you have a BBC computer someone somewhere is determined to educate you

Alphabet is a program aimed at very young children Its simple objective is to teach the alphabet via association of pictures and capital letters The child is presented with an object on screen and must move a cursor point at the correct initial letter

The program comes neatly packaged with a colourful booklet and a sturdy case It certainly looks like one of the better products of this type

Program *Alphabet*
Price *£9 95*
Micro *BBC B*
Supplier *Opal Soft*
112 Arterial Road
Eastwood
Leigh on Sea
Essex SS9 4DG

SPECIAL PRICE

3D Maze of Doom by James Paton for the ZX81 is not perhaps that special — standard *Wumpus/Transylvanian Tower* stuff More special is the price — 85p including postage No glossy packaging, of course and I'm not too sure about the quality of the cassette But for that price you can hardly go wrong

Program *3D Maze of Doom*
Price *85p*
Micro *ZX81 (16K)*
Supplier *James Paton*
2 The Avenue
Fallings Park
Wolverhampton

Pick of the week

FROM THE OUTER LIMITS

Codename Mat is the latest release from Micromega who, with *Lunar Crabs* and *Death chase*, have built a reputation for 3D games

Codename Mat is one of the best Spectrum games I've seen this year Describing it is far from easy Imagine a cross between *Timegate*, *Star Raiders* and *Star Trek* but with dozens of extra features and 3D sprite graphics

The solar system is being invaded on all sides by alien hordes Using your fleet of spaceships, you must destroy them

Derek Brewster, author of Velnor's Lair and Codename Mat for 48K Spectrum

This involves more than just chase attack sequences, although these are very well done It also requires tactical judgment on deciding when and where to go, ie, what segment needs your support most

One of the most impressive features are the 3D planets — reasonable facsimiles of the real things which grow from a speck to fill the screen You need to dock with the planets to refuel and repair after engaging in battle

Other features of the game include warp drive and 3D 'logic' ie everything moves on the scanners according to true spacial logic. There are also other fleets you can command via typed instructions, eg *R2DE2* meaning fleet in segment *R2* go and defend segment *E2*

The whole thing is in real time, so you can't just sit around waiting for inspiration — other parts of the galaxy will be under attack

The only problem with this game is its complexity — some people may be attracted by the amazing graphics, without realising that the game primarily demands thought and strategy At the highest levels it could last for hours A final point — it only costs £6 95 In terms of current pricing policies for Spectrum programs it's worth twice that

Derek Brewster who wrote the program, is a 25 year old programmer who is probably best known for *Velnor's Lair* — a highly regarded adventure game issued by Quicksilva He also wrote *Haunted Hedges* and *Star Crash* for MicroMega

Program *Codename Mat*
Price *£6 95*
Micro *Spectrum 48K*
Supplier *Micromega*
230 236 Lavender Hill
London SW11

TRUE 3D

For some companies, 3D means having little dots representing stars which move out from the middle of the screen to the edge — this is supposed to give you the impression of hurtling through the universe.

The truer 3D can be found on *Triad* from Live Wire — in it, spaceships move towards you with a true perspective, ie, getting slowly bigger and bigger. The game involves blasting away at a fleet of the advancing aliens, most dangerous of all being the Triad — ships which break away from the rest and come straight for you.

You can hardly call the basic concept original, but the excellence of the graphics make it well above the average.

Program *Triad*
Price *£6 95*
Micro *Commodore 64*
Supplier *Sumlock*
Royal London House
198 Deansgate
Manchester
M3 3NE

POT SHOTS

The only software house consistently taking pot shots at Ultimate's crown as producers of best Spectrum software is Ocean who has just issued *Eskimo Eddie*.

The game features, amongst other creatures, a penguin and a polar bear. What these animals have in common is a cold white habitat. Unfortunately, (from the point of view of geographical consistency) they live at opposite ends of the world, ie, North and South Poles.

You are *Eddie* and in the first part of the game you find yourself playing *Frogger* with a couple of icebergs and some charming polar bears who lollop lugubriously across your path. Why risk being crushed by these solemn and indifferent creatures — to rescue a penguin, of course, who for some reason can't look after himself.

If you rescue the penguin three times you move on to stage two, which involves you in some judicious iceberg shoving to kill various bugs. The graphics are superb, particularly the way the bears move, although otherwise the game is not the most original in the world.

Program *Eskimo Eddie*
Price *£5 95*
Micro *Spectrum 48K*
Supplier *Ocean Software*
Ralli Building
Stanley Street
Manchester M3 5FD

OPEN MIND

Paradox looks, from a quick play and the complex maps I've been sent explaining it, like one of the most complicated adventures ever designed.

The big problem with playing paradox is that nothing is what it seems, much is of your own imagination — the stuff of dreams and nightmares. The manufacturers suggest that you will need an open, intuitive mind to see the inner logic behind the puzzles.

There are four divisions to this mysterious world, the tunnel, the gamesboard the crystal palace and the Magician's room. Each area has its own specialised kinds of problem, some threaten your life, some your sanity. With well over a hundred rooms addiction is probably ensured.

Program *Paradox*
Price *£7 50*
Micro *Spectrum 48K*
Supplier *Runesoft*
Charnwood House
67 Lower Parliament Street
Nottingham
NG1 3BB

ITALIAN CAT

Someone in the Gruneberg Corporations has been doing a magnificent PR job. This foreign language system is now being made available by various software houses for more or less every micro you could name.

The system basically involves mental associations eg, in Italian the word for cat is 'gatto' so you imagine a cat eating a large gateau, etc.

Apparently this system works in teaching people a large vocabulary very quickly. Tansoft have just launched an Italian tutor using the system for the Oric and Atmos.

You are told by the computer what associations to imagine and are subsequently tested on them. A basic grammar of about 400 words is contained within the program.

Program *Italian*
Price *£12·95*
Micro *Oric/Atmos*
Supplier *Tansoft*
Unit 1 & 2
Cambridge
Techno Park
Newmarket Road
Cambridge

COCONUTS

More Dragon educational software. This time the subject is Physics and revision of the O level and CSE syllabus.

NWBC's *Physics I* divides its chosen field up into 100 multiple choice questions and sets them in the form of a simple game in which you have to make your way across a desert to some coconuts — you move by getting an answer right.

Aside from the game there are options for general revision, and for a timed examination.

Program *Physics 1*
Price *£6 90*
Micro *Dragon 32*
Supplier *N W B C*
204 High Street West
Sunderland
Tyne & Wear
SR1 1UA

DISARMING

Trafalgar is an unusual strategy game for the BBC B. As you might expect, it simulates the famous sea battle. The computer acts for the French.

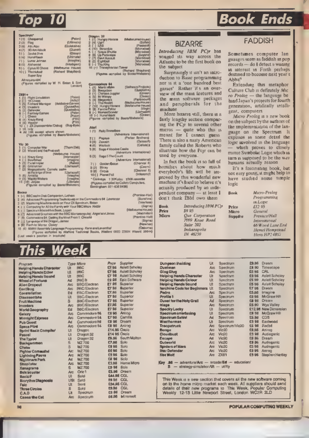
A plan shows the arrangement of the two forces lined up and ready to obliterate one another. You select which ships you wish to engage in battle and the screen changes to depict the confrontation.

You shoot it out, well more thud it out really. Cannon balls lurch back and forth making holes in the sails and, if you are lucky, igniting the magazine and sinking the enemy ship. Other factors include a gusting wind that will swerve your shots and a fireboat that you must blast from the water before it sets your fleet aflame.

Program *Trafalgar*
Price *£8 00*
Micro *BBC B*
Supplier *Squirrel Software*
4 Binloss Avenue
Eccles
Manchester M30 0TS




New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases, Popular Computing Weekly, 12-13 Little Newport Street WC2H 3LD



Top 10

Spectrum*

1 (1) Chequered (Psion)
2 (2) Flag (Ultimate)
3 (6) Atic Atac (Quicksilva)
4 (7) 3D Ant Attack (Durrell)
5 ( ) Scuba Dive (Ocean)
6 (4) Hunchback (Ultimate)
7 ( ) Lunar Jetman (Imagine)
8 (5) Alchemist (Intelligent)
9 (-) Cyrus II Chess (Melbourne House)
10 ( ) The Hobbit/Super Spy (Richard Shepherd)

All require 48K
(Figures compiled by W. H. Smith & Son London)

ZX81*

1 (1) Flight Simulation (Psion)
2 ( ) 1K Chess (Artic)†
3 (5) Football Manager (Addictive Games)
4 (3) Investors (Quicksilva)
5 (2) Defender (Quicksilva)
6 (-) Fantasy Games (Psion)
7 ( ) Chess (Psion)
8 (4) Krazy Kong (PSS)
9 (6) Hopper (PSS)
10 ( ) ZX Disassembler/Debug (Bug-Byte)

† 1K only
* All 16K except where shown
(Figures compiled by Boots/Websters)

Vic 20

1 (1) Computer War (Thorn EMI)
2 (3) Wizard and the Princess (Melbourne House)
3 (-) Krazy Kong (Interceptor)
4 ( ) Bewitched (Imagine)
5 (5) Paratrooper (Rabbit)
6 (6) Gridrunner (Llamasoft)
7 (2) Megagalactic Camels cattle at the edge of time (Llamasoft)
8 (8) Arcadia (Imagine)
9 (9) Wacky Waiters (Imagine)
10 (10) Jetpac (Ultimate)
(Figures compiled by Boots/Websters)

Dragon 32

1 (1) Hungry Horace (Melbourne House)
2 (4) Ugh! (Softek)
3 ( ) SAS (Peaksoft)
4 (10) Skramble (Microdeal)
5 ( ) Space Shuttle (Microdeal)
6 (9) Up Periscope (Beyond)
7 (7) Devil Assault (Microdeal)
8 (2) Eightball (Microdeal)
9 (-) The King (Microdeal)
10 (-) Transylvanian Tower (Richard Shepherd)
(Figures compiled by Boots/Websters)

Commodore 64

1 (1) Manic Miner (Software Projects)
2 (3) Boogaboo (Quicksilva)
3 (1) Chinese Juggler (Ocean)
4 (5) Mr Wimpy (Ocean)
5 (8) Megawarz (Paramount)
6 (-) The Hobbit (Melbourne House)
7 (10) Hungry Horace (Melbourne House)
8 (2) Falcon Patrol (Virgin)
9 (-) Hovver Bovver (Llamasoft)
10 (-) Hunchback (Ocean)
(Figures compiled by Boots/Websters)

Atari

1 (1) Rally Speedway (Adventure International)
2 ( ) Popeye (Parker Brothers)
3 (4) Zaxxon (Datasoft)
4 (6) Warlock (Cellulo)‡
5 (8) Saga 4 Voodoo Castle (Adventure International)
6 (3) Saga 5 The Count (Adventure International)
7 ( ) Golden Baton (Channel 8)
8 (2) Blinky (Cosmi)
9 (8) Circus (Channel 8)
10 ( ) Planet Fall (Infocom)†

* Cartridge † 32K plus ‡ 16K cassette
(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

Books

1 (-) BBC Micro Disk Companion, Latham (Prentice-Hall)
2 (4) Advanced Programming Techniques on the Commodore 64 Lawrence (Sunshine)
3 (2) Mastering Machine-code on Your ZX Spectrum, Baker (Interface)
4 ( ) Computing for All the Family with Your BBC Micro Noble (Sigma)
5 ( ) Spectrum Microdrive Book, Logan (Melbourne House)
6 (7) Advanced Graphics with the BBC Microcomputer Angel and Jones (Macmillan)
7 (9) Commodore 64 Getting the Most From It Crosbie (Prentice-Hall)
8 ( ) Language of the Dragon, James (Sigma)
9 (8) Forth for Micros Oakey (Newnes)
10 (6) 68000 Assembly Language Programming Kane and Leventhal (Osborne)
(Figures compiled by Watford Technical Books, Watford 0923 23824 Wsend 28644)

(Last week's position in brackets)

Book Ends

BIZARRE

Introducing IBM PCjr has winged its way across the Atlantic to be the first book on the subject.

Surprisingly it isn't an introduction to Basic programming nor is it a 'one hundred best games'. Rather it's an overview of the main features and the main software packages and peripherals for the machine.

More bizarre still, there is a fairly lengthy section comparing the PCjr to several other micros — quite who this is meant for I cannot guess. There is also a nasty American family called the Roberts who illustrate how the Pcjr can be used by everyone.

In fact the book is so full of homilies about how much everybody's life will be improved by this wonderful new machine it's hard to believe it's actually produced by an independant company — at least I don't think IBM own them.

Book	*Introducing IBM PCjr*
Price	$9 95
Micro	*Que Corperation 7999 Knue Road Suite 202 Indianapolis IN 46250*

FADDISH

Sometimes computer languages seem as faddish as pop records — do I detect a waning in interest in Forth perhaps destined to become next year's Abba?

Extending this metaphor Culture Club is definitely *Micro Prolog* — the language behind Japan's projects for fourth generation, artifically intelligent, computers.

Micro Prolog is a new book on the subject by the authors of the implementation of the language on the Spectrum. It explains in some detail the logic involved in the language — which proves to closely mimic Symbolic Logic which in turn is supposed to be the way humans actually reason.

It's a fascinating book, but not easy going, it might help to have studied some simple logic.

Book	*Micro-Prolog Programming in Logic*
Price	*£12 95*
Micro	*General*
Supplier	*Prentice/Hall International 66 Wood Lane End Hemel Hempstead Herts HP2 4RG*

This Week

Program	Type	Micro	Price	Supplier
Helping Hands Character	Ut	BBC	£7 95	Aslett Scholey
Helping Hands Color	Ut	BBC	£7 95	Aslett Scholey
Helping Hands Sound	Ut	BBC	£7 95	Aslett Scholey
Wheel of Fortune	Ad	BBC B	£9 95	Epic Software
Alien Dropout	Arc	BBC/Electron	£7 95	Superior
Centibug	Arc	BBC/Electron	£7 95	Superior
Constellation	Ed	BBC/Electron	£7.95	Superior
Disassemble	Ut	BBC/Electron	£7 95	Superior
Fruit Machine	S	BBC/Electron	£7 95	Superior
Invaders	Arc	BBC/Electron	£7.95	Superior
World Geography	Ed	BBC/Electron	£7 95	Superior
Galaxy	Arc	Commodore 64	£8 95	Anirog
Midnight Express	Arc	Commodore 64	£7 00	Camilla
Pub Quest	Ad	Commodore 64	£8 95	Dream
Space Pilot	Arc	Commodore 64	£8 95	Anirog
Sprint Basic Compiler/	Ut	Dragon	£14.95	Oasis
Pascal	Ut	Dragon 32	£14 95	Oasis
The Typist	Ut	Dragon 32	£9.95	South Molton
Backgammon	S	MZ 700	£7.95	Solo
Chess	S	MZ 700	£8 95	Solo
Fighter Command	Arc	MZ 700	£6 95	Solo
Lightning Pass	Arc	MZ 700	£5 95	Solo
Nightmare Park	Ad	MZ 700	£6 95	Solo
Shoplifter	Arc	MZ 700	£3.95	Home Micro
Xanagrams	S	MZ 700	£5 95	Solo
Bobsleigh	Arc	Oric 1	£5.95	Dream
Basic F	Ut	Sord	£44.95	CGL
Biorythm Diagnosis	Ut/S	Sord	£6 95	CGL
Falc	Ut	Sord	£34.95	CGL
Three Circles	S	Sord	£9.95	CGL
C.A.D	Ut	Spectrum	£6 95	Dream
Caesar the Cat	Arc	Spectrum	£6.95	Mirrorsoft
Dungeon Building	Ut	Spectrum	£9.95	Dream
Dustman	Arc	Spectrum	£6 90	Timescape
Glug Glug	Arc	Spectrum	£5 95	CRL
Helping Hands Character	Ut	Spectrum	£5 95	Aslett Scholey
Helping Hands Colour	Ut	Spectrum	£5 90	Aslett Scholey
Helping Hands Sound	Ut	Spectrum	£5 95	Aslett Scholey
Machine Code for Beginners	Ut	Spectrum	£7 95	Dream
Pedro	Arc	Spectrum	£5.95	Imagine
Profile 1	Ut	Spectrum	£8 95	McGraw Hill
Quest for the Holy Grail	Ad	Spectrum	£6 95	Dream
Siege	Arc	Spectrum	£5 90	Wye Valley
Specky Lecky	Ut	Spectrum	£12.95	New Dimension
Spectrum interfacing	Ut	Spectrum	£8 95	McGraw Hill
Spectrum Safari	Ad	Spectrum	£5.95	CDS
Weatherman	Ut	Spectrum	£5 95	Eastwood
Troopatruck	Arc	Spectrum/Vic20	£5 95	Rabbit
Bongo	Arc	Vic20	£8.95	Anirog
Cloudburst	Arc	Vic20	£5 95	Audiogenic
Escape	Ad	Vic20	£6 95	Dream
Outworld	Arc	Vic20	£8 95	Audiogenic
Spiders of Mars	Arc	Vic20	£5 95	Audiogenic
Star Defender	Arc	Vic20	£6 95	Anirog
Sea Wolf	Arc	ZX81	£5 95	Stephen Hartley

Key .96 — adventure/Arc — arcade/Ed — education/
S — strategy-simulation/Ut — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to This Week, Popular Computing Weekly 12-13 Little Newport Street, London WC2R 3LD



An awkward childhood

In this, the first of two articles, I will try to explain the current obsession with copyright law. In the second article, I will attempt to cover the changes in the law desired by the industry and the pitfalls that must be considered in making these changes.

I am not a legal expert, just a paltry marketing man — so legal experts should read no further for they will learn nothing from this piece except that marketing men may not be totally accurate when talking about technical subjects. However, if you are not a legal expert but just interested in the question, then at least you won't find yourself dazzled by jargon.

For such a high tech industry, we seem to be spending more and more of our time obsessed with what is a pretty low tech piece of legislation embodied in the 1956 Copyright Act. The reason for the growing obsession is the very low tech nature of a law that did not foresee many of the wonders of the current electronic age, let alone the even more wondrous electro future that awaits us. The result is that legal protection that would have been taken for granted in any other sphere of creative or intellectual endeavour may or may not exist for computer software.

The situation is made worse by the uncertainty of the question and because of the eccentricities of our legal system. The only two ways of changing the system are either to get new legislation through Parliament, which takes a very long time, or to set a judicial precedent by taking a case through the courts, which also takes quite a long time and costs a small (or sometimes not so small!) fortune. This is why software copyright remains in a legal limboland awaiting action from the brave, the foolhardy or the Government.

Copyright is the most basic form of protection of intellectual property. In the UK any work is automatically protected by copyright — providing and only providing the work meets the criterion of the Copyright Act. You don't have to do anything to be covered.

It is a good idea though to write a copyright notice on your work along with your name and the year, ie © Nick Alexander 1984, to frighten people off but it won't make it copyright if it isn't. It may also be advisable to log a copy of your work with either a bank or a solicitor to establish the date it was completed.

Trade marks or patents, on the other hand, have to be applied for and granted, which takes time and costs money. Because of its simplicity copyright is an ideal device for the individual and is used to protect all literary, musical and artistic works from unscrupulous thieves.

Current copyright legislation is embodied in an Act of Parliament passed in 1956. It does not mention computer software, for obvious reasons, but general legal opinion is that software is covered by the definition of the type of works that are mentioned. However, the software industry was thrown into further turmoil last month when an Australian court ruled that copyright did not apply to software.

Logically, there can be no argument that an original software program should not benefit from the same protection given to an original song, play or novel. But the fact that a court of law, albeit an Australian one, can throw this out, leaving the way clear for anyone to steal anybody else's program, demonstrates that we cannot be complacent about software legal protection.

The legal position on software copyright must be clarified, and rapidly, if our still infant industry is to survive what looks set to be an awkward childhood and make it into a healthy adolescence.

Nick Alexander

A losing streak

Puzzle No 98

Poor Tom was looking a bit down in the mouth after having had a losing streak at the races.

It appeared he lost as many pennies as he originally had pounds, and as many pounds as he originally had pennies. And to cap it all he had managed to drop a 50 pence piece down a drain grating as well!

Purely coincidentally, you understand, this left him with just half the amount that he had to begin with.

How much was this?

Solution to Puzzle No 93

The program uses an array to represent the pile of cards. Each card that is discarded is made non-zero. When all but one card has been rejected, the remaining value in the array that is still zero shows the location of the winning card.

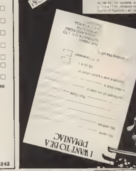
```
10 DIM A(999) 20 LET C = 0 30 LET T = 1 40 LET A(T) = 1 60 LET C = C + 1 60 IF C = 998 THEN GOTO 200 70 LET T = T + 1 80 IF T > 1000 THEN LET T = 1 90 IF A(T) = 0 THEN GOTO 70 100 LET T = T + 1 110 IF T > 1000 THEN LET T = 1 120 IF A(T) = 0 THEN GOTO 100 130 GOTO 40 200 FOR N = 1 TO 999 210 IF A(N) = 0 THEN PRINT N 220 NEXT N
```

The winning card was originally in 974th place from the top of the pile.

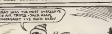
Winner of Puzzle No. 93

The winner is Mrs Innes, Davide Close, Alverston, Bristol, who receives £10





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advance news of the PiMan's plans
I WANT TO BE A PIMANIAC



THAT WAS THE MOST IMPRESSIVE MID AIR TRIPLE-JACK KNIFE SOMERSAULT I'VE EVER SEEN'
PLEASE NOTE THESE BOOTS ARE NOT SENSIBLE!
YEAH' D'YOU WANNA HAND DIGGIN HIM OUT?



HOW DID YOU DO THAT?
STCHEFT! STCHEFT!
THAT STUPID BILLBOARD. WHO PUT IT THERE? AND WHY WAS THAT ORDER FORM STUCK UPSIDE-DOWN"
SO AS TO ATTRACT THE ATTENTION OF POTENTIAL PIMANIACS' SPECIAL OFFERS FOR THEM, AND MORE SUPPORT FOR YOU!



GOOD I THINK I'M GOING TO NEED ONE
IF ONLY WE CAN GET HIM TO DO THAT STUNT ON THE DAY, HE'LL PICK UP THE GOLD EASILY!"
LATER
HOY' YOU'RE SUPPOSED TO BE IN TRAINING!
GO AWAY! I'M CONVALESCING
SWAT
WELL YOU CAN CONVALESCE ON HORSEBACK JUST AS WELL
AWWW!



THIS HORSE DOESN'T LIKE ME! I CAN SENSE IT. THIS HORSE HATES ME!
NONSENSE ZEDDERKS IS A LOVELY ANIMAL NOW OFF YOU GO!
LOOK I'LL COMPROMISE



SO...
LOOK AT HIM TAKE THOSE WALLS! NICE CANTER THERE ..OOP' HE'S GONE IN THE DRINK.. NOT TO WORRY, HE'S UP AGAIN OVER THE HEDGE BEAUTIFUL MEASURED TROT -
OKAY, NOW HOW ABOUT TRYING IT WITH THE HORSE, PIMAN?
WAIT I THINK HIS FEATHERS ARE LOOSE
NEXT TIME MORE RUBBISH CONS AND BROKEN PROMISES (NO BUT TRUTHFULLY..)